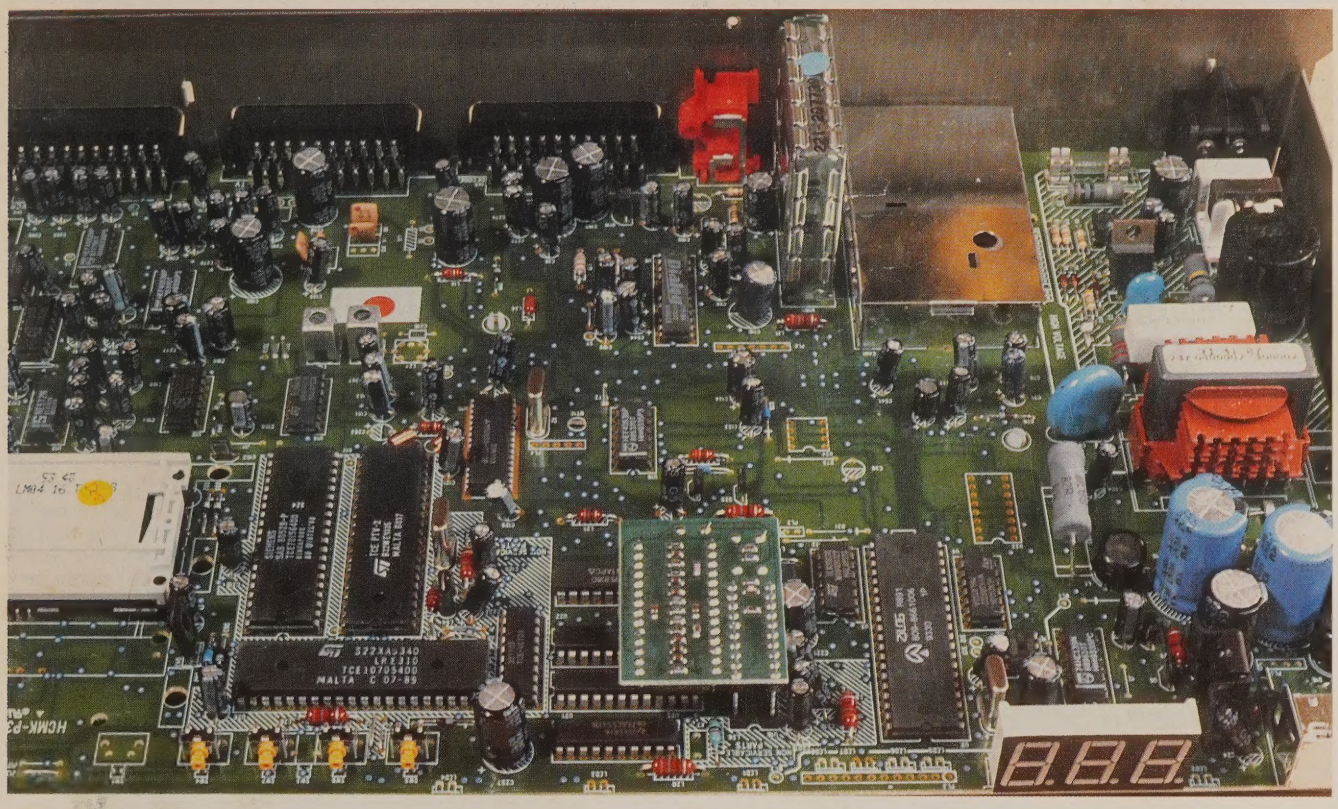
FEBRUARY 1994

£2.20

TELEVISION

SERVICING·VIDEO·SATELLITE·DEVELOPMENTS

FREE TV STANDARDS GUIDE



The Pace PRD800 Satellite Receiver

Introduction to Teletext Circuitry

The Dolby Surround Sound System

Notes on the Bush 2521T · DX-TV

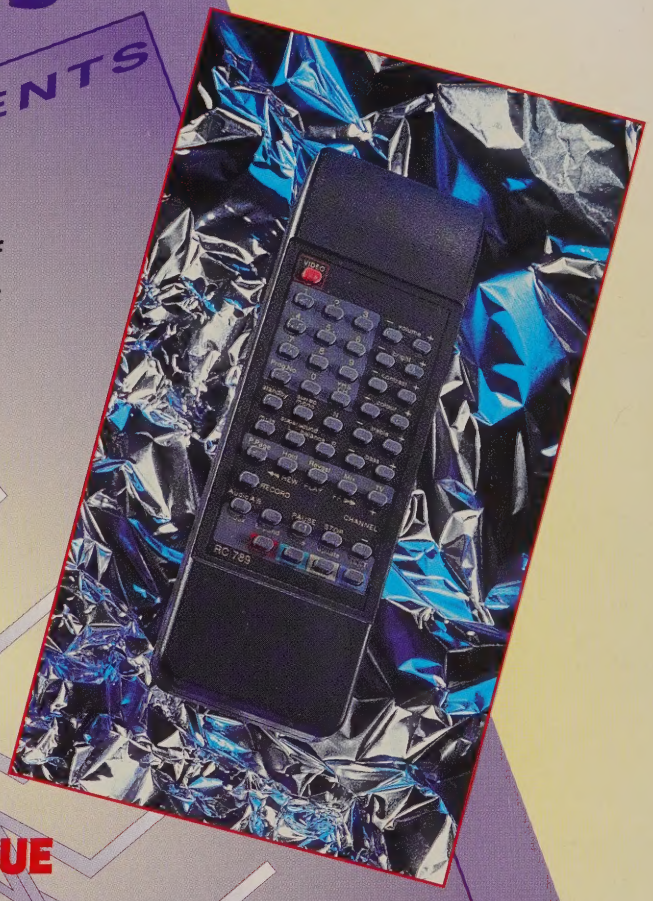
Screen Entertainment 2000 Report

VCR Clinic · TV Fault Finding

A REED BUSINESS PUBLICATION

9 770032 647047 02>

Tune to an exciting new range of Philex catalogues



VIDEO & TV CATALOGUE

A comprehensive cross reference, listing over 160 brands & thousands of (approx 4,000 to 5,000) Video models both UK & European

- ★ Illustrations and original part numbers.
- ★ Individual cross reference for video heads, video belts & TV line output transformers.

PRODUCTS FOR VIDEO INCLUDE:

- ★ An extensive range of heads, belts, idler tyres, pinch rollers, clutches, gears, idlers, pulleys, spools, switches, tension bands, motors, service kits.

PRODUCTS FOR TV INCLUDE:

- ★ An extensive range of line output transformers and mains switches.

REMOTE CONTROL CATALOGUE

124 replacement remote controls for TV, Video & Satellite contains:

- ★ A comprehensive cross reference listing 92 brands approx 6000 models, both UK and European.
- ★ Listings include model name and number, chassis numbers & original remote control type and number.
- ★ Line drawings of original remotes and the corresponding Philex replacement remotes.

PHILEX PLC

INDISPENSABLE REFERENCE BOOK FOR ANYONE CONNECTED WITH THE VIDEO/TV REPAIR BUSINESS

Phone or Fax us now for our latest catalogue for Retailers, Wholesalers and Distributors!
(to assist us please name your local Distributor)

PHILEX PLC

PHONE OR FAX NOW TO ORDER
TEL: 081 - 202 - 1717 / 1919
FAX: 081 - 202 - 0015 / 0014
Philex House . 110 - 124 The Broadway
West Hendon . London NW9 7BP

TELEVISION

February 1994

Vol. 44, No. 4
Issue 520

On sale January 19th

COPYRIGHT
© Reed Business Publishing Ltd., 1994. Copyright in all drawings, photographs and articles published in *Television* is fully protected and reproduction or imitation in whole or in part is expressly forbidden. All reasonable precautions are taken by *Television* to ensure that the advice and data given to readers are reliable. We cannot however guarantee it and we cannot accept legal responsibility for it.

CORRESPONDENCE
All correspondence regarding advertisements should be addressed to the Advertisement Manager, "Television", Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.Editorial correspondence should be addressed to "Television" Editorial Department, Reed Business Publishing, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

INDEXES AND BINDERS
Indexes for Vols. 38 to 42 are available at £3.50 each from Video Interface Products Ltd., who can also supply a five-year consolidated index on computer disk. For further details see page 279.

Binders that hold twelve issues of *Television* are available for £5 each from Television Binders, 78 Whalley Road, Wilpshire, Blackburn BB1 9LF. Make cheques payable to "Television Binders".

SUBSCRIPTIONS
An annual subscription costs £26 in the UK, £37 for Eire/Europe airmail (postage included for all rates) Rest of the world airmail availabe upon request). Send orders with payment to Quadrant Subscription Services Ltd., Oakfield House, Perrymount Road, Haywards Heath, Sussex, RH16 3DH.

Subscription hotline for 24-hour ordering with Credit Card telephone 0622 721666 quoting INJ.

BACK NUMBERS
Some back issues are available at £2.75 each from Television Back Issues, Room L323, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Make cheques/postal orders payable to Reed Business Publishing Ltd. See box on page 253.

ISSN 0032-647X

241 ***Leader***

242 ***Teletopics***

244 ***VCR Clinic***
Reports from Eugene Trundle, Terry Lamoon, Brian Storm, Gerald Smith, Chris Watton, Michael Dranfield, Nick Beer, Simon Bodgett, J.K. Potts, Fauz Ahmed Sumar, John Edwards, John Hopkins and Bob McClenning.

248 ***The Pace PRD800 Satellite Receiver*** — ***J. LeJeune***
A look at the technical features and circuitry used in this satellite receiver.

252 ***What a Life!*** — ***Donald Bullock***

253 ***Test Case 374***

254 ***Dolby Surround Sound*** — ***Ian Martin***
The techniques used to provide centre and surround sound channels in addition to the conventional stereo left and right and the way in which they are implemented.

258 ***Help Wanted***

259 ***Screen Entertainment 2000*** — ***George Cole***
A look at what lies ahead in the video field.

262 ***Modern TV Receiver Techniques: Teletext*** — ***Eugene Trundle***
Basic prinicples of teletext transmission, reception and decoding.

267 ***Next Month in Television***

270 ***TV Fault Finding***
Reports from Philip Blundell, AMIEIE, Brian Storm, Edward Joyce, J.G. Grieve, Michael Dranfield.,John Edwards, Richard Flowerday, John Hepworth and Terry Lamoon.

273 ***Camcorner***
Reports from David C. Woodnott and Keith T. Keeton.

274 ***Long-distance Television*** — ***Roger Bunney***
Reports on DX conditions and reception and news from abroad.

280 ***Notes on the Bush 2521T*** — ***Chris Watton***
The reprogramming procedure and general service notes.

281 ***Back to Basics***
Chris Avis reports on the video courses run by Steve Beeching, T. Eng.

282 ***Satellite Scene***
Modification and fault notes from David Finan, Steve Cannon, Chris Watton and Graham Rees.

283 ***Letters***

OUR NEXT ISSUE DATED MARCH WILL BE PUBLISHED ON FEBRUARY 16

BC107	8p
BC108	8p
BC109	8p
BC109C	10p
BC140	20p
BC141	20p
BC142	20p
BC143	20p
BC147	8p
BC148	8p
BC149	8p
BC157	8p
BC159	8p
BC160	30p
BC171	10p
BC172	10p
BC177	14p
BC178	14p
BC179	14p
BC182	7p
BC182L	7p
BC183	7p
BC183L	7p
BC184	7p
BC184L	7p
BC212	7p
BC212L	7p
BC213	7p
BC213L	7p
BC214	7p
BC214L	7p
BC237	7p
BC238	7p
BC239	7p
BC300	20p
BC301	20p
BC302	20p
BC303	20p
BC304	25p
BC327	7p
BC328	7p
BC337	7p
BC338	7p
BC441	28p
BC446	8p
BC449	15p
BC461	28p
BC477	18p
BC478	18p
BC516	22p
BC537	25p
BC546	8p
BC547	8p
BC548	8p
BC549	8p
BC550	8p
BC556	8p
BC557	7p
BC558	8p
BC559	8p
BC560	8p
BC637	20p
BC638	20p
BC639	20p
BC640	20p
BCY70	16p
BCY71	16p
BCY72	16p
BD115	30p
BD124P	50p
BD131	25p
BD132	25p
BD133	50p
BD135	20p
BD136	20p
BD137	20p
BD138	20p
BD139	20p
BD140	20p
BD144	90p
BD157	38p
BD166	30p
BD175	30p
BD177	30p
BD179	32p
BD181	45p
BD182	60p
BD184	60p
BD187	30p
BD201	33p
BD202	38p
BD203	42p
BD204	42p
BD222	31p
BD225	31p
BD232	31p
BD233	30p
BD234	32p
BD235	28p
BD236	30p
BD237	21p
BD238	24p
BD239	30p
BD240	40p
BD241A	40p
BD243A	50p
BD244	50p
BD245	50p
BD246A	50p
BD265	45p
BD267	45p
BD269	45p
BD278	50p
BD311	100p
BD314	100p
BD315	150p
BD317	150p
BD331	40p
BD332	40p
BD361	60p
BD362	80p
BD370	30p
BD371	30p
BD410	50p
BD433	28p
BD434	30p
BD435	31p
BD436	30p
BD437	28p
BD438	36p
BD439	40p
BD440	40p
BD441	40p
BD533	50p
BD534	38p
BD535	38p
BD536	38p
BD537	40p
BD538	40p
BD643	50p
BD645	50p
BD647	50p
BD649	50p
BD675	40p
BD676	40p
BD677	38p
BD678	40p
BD679	40p
BD680	40p
BD681	45p
BD682	45p
BD705	50p
BD707	50p
BD709	50p
BD711	50p
BD736	50p
BD826	50p

BD828	50p
BD897	50p
BD899	50p
BD901	50p
BD977	50p
BDX32	100p
BDX33	60p
BDX65	80p
BDW23	55p
BDW24	55p
BDW93	50p
BDW94	50p
BDY92	100p
BF137	35p
BF167	30p
BF180	16p
BF181	18p
BF183	20p
BF195	7p
BF199	8p
BF200	16p
BF225	30p
BF240	16p
BF245	25p
BF254	15p
BF255	12p
BF256	18p
BF257	18p
BF258	18p
BF259	18p
BF262	25p
BF263	25p
BF270	18p
BF273	15p
BF311	21p
BF336	20p
BF337	20p
BF338	20p
BF362	30p
BF367	13p
BF371	17p
BFR40	25p
BFR90	52p
BFR91	99p
BFT43	30p
BFX29	20p
BFX84	20p
BFX85	20p
BFX87	15p
BFX88	15p
BFX89	60p
BFY17	30p
BFY18	40p
BFY50	14p
BFY51	14p
BFY52	14p
BFY56	25p
BFY64	25p
BFY90	45p
BLY48	85p
BR100	14p
BR103	37p
BR303	85p
BRY49	38p
BSS74	33p
BSX20	15p
BSX26	18p
BT100A	70p
BT106	180p
BT109	90p
BT119	100p
BT146	99p
BT151	58p
BTY79	140p
BU100A	110p
BU104	80p
BU105	80p
BU108	100p
BU109	80p
BU110	110p
BU111	140p
BU124	60p
BU126	65p
BU180	150p
BU184	100p
BU204	75p
BU205	70p
BU206	100p
BU208	70p
BU208A	75p
BU208AT	200p
BU208D	130p
BU209	140p
BU225	190p
BU226	190p
BU312	120p
BU325	55p
BU326	75p
BU406	70p
BU406D	85p
BU407	55p
BU407D	80p
BU408	75p
BU408D	85p
BU409	95p
BU426A	70p
BU500	100p
BU508A	75p
BU508AF	95p
BU508D	80p
BU508DF	115p
BU526	75p
BU536	100p
BU546	140p
BU608	150p
BU626	160p
BU636	150p
BU801	80p
BU806	75p
BU807	70p
BU902	130p
BU903	130p
BU920	130p
BU922	130p
BU930	130p
BUT11AF	80p
BUT12	80p
BUT56A	150p
BUX80	180p
BUX84	50p
BUX85	50p
BU69A	200p
BUY71	300p
BUZ71	75p
C106D	28p
MJ1000	200p
MJ1001	200p
MJ10012	300p
MJ15001	325p
MJ15002	300p
MJ15003	325p
MJ15004	370p
MJ2501	110p
MJ2955	55p
MJ3000	115p
MJ3001	115p
MJE29A	30p
MJE30A	30p
MJE340	25p
MJE350	80p
MJE520	30p
OC28	350p
OC29	250p
OC35	350p
OC36	250p
OC45	50p
OC72	50p
OC200	180p

R2008B	100p
R2010B	100p
S2800D	52p
S2800M	72p
T2800D	52p
T2800M	72p
TIP29	15p
TIP29A	22p
TIP29C	25p
TIP30	25p
TIP30C	30p
TIP31A	22p
TIP31C	30p
TIP32	24p
TIP32A	21p
TIP32C	28p
TIP33	50p
TIP33C	80p
TIP34	50p
TIP34C	60p
TIP35C	65p
TIP36C	85p
TIP41A	20p
TIP41C	22p
TIP42A	20p
TIP42C	22p
TIP47	40p
TIP48	40p
TIP50	60p
TIP51	120p
TIP52	120p
TIP53	120p
TIP54	140p
TIP105	65p
TIP106	65p
TIP107	65p
TIP110	40p
TIP111	50p
TIP112	40p
TIP115	45p
TIP116	45p
TIP117	50p
TIP120	37p
TIP121	46p
TIP122	47p
TIP125	47p
TIP126	56p
TIP127	56p
TIP130	30p
TIP131	30p
TIP141	90p
TIP142	90p
TIP145	65p
TIP146	90p
TIP147	100p
TIP150	90p
TIP151	90p
TIP2955	42p
TIP3054	45p
TIP3055	42p
TIS44	40p
TIS61	15p
TIS90	15p
TIS91	18p
TIS93	20p
VK1010	88p
VN10KM	60p
VN66AF	100p
VN88AF	115p
ZTX107	11p
ZTX108	11p
ZTX109	12p
ZTX212	27p
ZTX300	13p
ZTX301	16p
ZTX302	16p
ZTX303	24p
ZTX304	17p
ZTX320	29p
ZTX500	13p
ZTX501	13p
ZTX502	18p
ZTX503	18p
ZTX504	25p
ZTX550	24p
2N696	26p
2N697	22p
2N698	40p
2N706	22p
2N708	22p
2N914	28p
2N930	18p
2N1131	28p
2N1132	28p
2N1613	24p
2N1711	24p
2N1893	30p
2N2102	50p
2N2218A	24p
2N2219	24p
2N2221	23p
2N2222	23p
2N2369	15p
2N2484	20p
2N2646	40p
2N2904	20p
2N2905	20p
2N2906	18p
2N2907	18p
2N2926	8p
2N3019	28p
2N3053	18p
2N3054	40p
2N3055	38p
2N3055H	50p
2N3440	58p
2N3442	85p
2N3585	120p
2N3702	9p
2N3703	9p
2N3704	9p
2N3705	9p
2N3706	9p
2N3707	9p
2N3708	9p
2N3710	12p
2N3711	12p
2N3771	85p
2N3772	90p
2N3773	100p
2N3799	18p
2N3819	29p
2N3866	68p
2N3903	11p
2N3904	11p
2N3905	11p
2N3906	11p
2N4031	25p
2N4036	25p
2N4062	12p
2N4064	100p
2N4401	12p
2N4403	12p
2N4443	76p
2N5061	20p
2N5088	20p
2N5192	50p
2N5241	500p
2N5245	45p
2N5294	30p
2N5296	30p
2N5366	25p
2N5401	12p
2N5448	12p
2N5496	80p
2N6107	40p
2N6292	40p

2N6385	120p
2N6403	160p
3N143	65p
DIODES	
Rectifier Diodes	
BY127	8p
BY133	8p
BY164	40p
BY179	35p
BY184	32p
BY196	20p
BY206	11p
BY207	11p
BY210	22p
BY225	120p
BY227	19p
BY228	28p
BY296	20p
BY298	23p
BY299	22p
BYX10	15p
BYX55/350	30p
BYX55/600	25p
BYX70/500	32p
OA47	10p
OA90	10p
OA91	10p
OA200	10p
OA202	10p
IN.914	2p
IN.4001	3p
IN.4002	3p
IN.4003	3p
IN.4004	3p
IN.4005	3p
IN.4006	3p
IN.4007	4p
IN.4148	2p
IN.5400	9p
IN.5401	8p
IN.5402	8p
IN.5403	8p
IN.5404	8p
IN.5405	11p
IN.5406	12p
IN.5407	12p
IN.5408	12p
RGP15	15p
RGP30	16p
SKE4F2/06	60p
SKE4F2/08	80p
SKE4F2/10	100p
SR2M	60p
I.C. SOCKETS	
8PIN	5p
14PIN	6p
16PIN	7p
18PIN	10p
20PIN	12p
22PIN	13p
24PIN	14p
28PIN	16p
40PIN	18p
ZENERS	
400 MW	
BZY88 RANGE	
2V7 to 39V	5p
1.3W	
BZX61 RANGE	
2V7 to 39V	9p
CRYSTALS	
Freq in MHz	
1.0	260p
2.4576	180p
3.276	115p
4.0	110p
4.194	130p
4.43	95p
5.0	130p
6.0	115p
10.0	140p
11.0	250p
12.0	120p
14.756	200p
15.0	160p
18.0	130p
18.432	130p
24.0	250p
48.0	160p
VOLTAGE REGULATORS	
7805	25p
7806	25p
7808	25p
7812	25p
7815	25p
7818	25p
7824	25p
7905	25p
7906	30p
7908	30p
7912	30p
7915	30p
7918	30p
7924	30p
78L05	24p
78L08	24p
78L12	24p
78L15	24p
78L18	24p
78L24	24p
79L05	35p
79L08	35p
79L12	35p
79L15	35p
7818KC	100p
7824KC	100p
LM309K	100p
LM317K	200p
LM317T	100p
LM323K	350p
LM723	35p
78H08KC	800p
78H12KC	700p
79HGKC	800p
VALVES	
DAF96	100p
DY87	80p
EB91	50p
EBF80	60p
EBF89	60p
ECC84	80p
ECH83	100p
ECH84	90p
ECL80	65p
ECL82	80p
ECL84	100p
ECL85	80p
EF85	80p
EF183	75p
EF184	85p
EL34	300p
EL95	85p
EL500	100p

EY86	70p
EY87	70p
EY88	80p
PC97	100p
PCC85	60p
PCF80	100p
PCF801	110p
PCF802	80p
PCF806	115p
PCH200	100p
PCL81	65p
PCL82	80p
PCL84	60p
PCL85	80p
PCL805	80p
PFL200	110p
PL36	120p
PL83	60p
PL84	80p
PL95	180p
PL504	120p
PL508	200p
PL519	430p
PY81	100p
PY88	100p
PY500A	190p
LED's	
3mm	
RED	5p
YELLOW	8p
GREEN	8p
5mm	
RED	5p
YELLOW	8p
GREEN	8p
RECTANG. LED's	
5mm × 2.5mm	
RED	5p
YELLOW	8p
GREEN	8p
LINEAR IC's	
AN203	210p
AN210	165p
AN214Q	170p
AN228	280p
AN240P	130p
AN252	150p
AN259	250p
AN262	140p
AN271	230p
AN274	250p
AN301	330p
AN303	250p
AN304	360p
AN315	210p
AN316	350p
AN360	100p
AN362	140p
AN366	150p
AN610	160p
AN612	160p
AN3312	350p
AN3320K	800p
AN3331K	900p
AN3792	400p
AN3794	450p
AN3795	500p
AN3821	800p
AN3821K	600p
AN3822K	700p
AN3830K	800p
AN3990K	300p
AN3991K	400p
AN5010	450p
AN5011	400p
AN5015	350p
AN5020	200p
AN5025	250p
AN5030	550p
AN5033	400p
AN5034	500p
AN5111	550p
AN5132	250p
AN5135	600p
AN5138	450p
AN5150	800p
AN5151	600p
AN5215	100p
AN5250	150p
AN5256	150p
AN5260	350p
AN5262	175p
AN5265	150p
AN5352	600p
AN5355	450p
AN5410	375p
AN5411	450p
AN5421	150p
AN5429	420p
AN5431	300p
AN5440	400p
AN5510	400p
AN5512	250p
AN5515	200p
AN5520	550p
AN5521	250p
AN5612	400p
AN5613	200p
AN5615	300p
AN5620	330p
AN5622	350p
AN5625	400p
AN5712	350p
AN5722	140p
AN5730	180p
AN5732	160p
AN5753	170p
AN5763	450p
AN5790	300p
AN5791	350p
AN5836	450p
AN5862	300p
AN6135	150p
AN6238	400p
AN6247	200p
AN6270	400p
AN6300	600p
AN6306	550p
AN6307	250p
AN6320	300p
AN6328	400p
AN6332	390p
AN6337	420p
AN6341	550p
AN6344	440p
AN6350	610p
AN6359	500p
AN6360	320p
AN6362	480p
AN6371	470p
AN6387	560p
AN6811	130p
AN6884	240p
AN7105	210p
AN7110	130p
AN7114	150p
AN7115	150p
AN7116	90p
AN7120	130p
AN7130	110p
AN7140	450p

AN7145	195p
AN7146	210p
AN7154	180p
AN7156	240p
AN7168	260p
AN7178	270p
AN7222	180p
AN7254	150p
AN7256	250p
AN7310	90p
AN7311	90p
AN7410	250p
AY3-1015	290p
AY3-1270	800p
AY3-1350	450p
AY3-8910	360p
AY3-8912	400p
BA301	65p
BA311	80p
BA313	60p
BA333	100p
BA340	150p
BA401	60p
BA402	60p
BA511	160p
BA514	160p
BA516	150p
BA521	160p
BA524	240p
BA526	180p
BA527	95p
BA532	140p
BA534	290p
BA536	180p
BA546	180p
BA612	160p
BA656	150p
BA658	380p
BA684	400p
BA685	400p
BA1310	160p
BA1320	110p
BA1330	160p
BA1360	180p
BA4403	220p
BA5101	400p
BA5102	220p
BA5204	200p
BA5402	180p
BA5406	180p
BA5408	180p
BA6104	250p
BA6208	250p
BA6209	260p
BA6304	120p
BA6305	140p
BA6410	220p
BA6411	250p
BA6993	150p
BA7001	150p
BA7004	200p
BA7007	200p
BA7021	180p
BA7022	350p
BA7751LS	150p
BA7752	250p
BA7755	150p
BA7767AS	200p
CX108	950p
CX134A	950p
CX136	600p
CX139	1450p
CX139A	750p
CX141	750p
CX143	800p
CX143A	1250p
CX145	725p
CX1508	325p
CX158	825p
CX175	325p
CX186	750p
CX187	825p
CX804A	775p
CX832	825p
CX867	575p
CX868	525p
CX877	300p
HA1125	150p
HA1137W	135p
HA1197	150p
HA1199	145p
HA1319	240p
HA1338	300p
HA1339A	350p
HA1377	160p
HA1388	320p
HA1389	210p
HA1392	200p
HA1394	280p
HA1397	250p
HA1398	240p
HA11219	280p
HA11221	160p
HA11225	150p
HA11235	145p
HA11251	240p
HA11423	210p
HA11724	800p
HA12002	300p
HA12003	250p
HA12005	320p
HA12017	130p
HA13001	170p
HA13002	250p
HA13006	400p
HA13007	400p
HA13108	350p
HA13412	600p
HA13432	400p
HA17524	250p
HA17805	100p
ICL7106	650p
ICL7611	90p
ICL7660	240p
ICM7555	60p
ICM75556	80p
KA2101	100p
KA2102	150p
KA2130	150p
KA2206	150p
KA2209	125p
KA2210	230p
KA2212	80p
KA2213	130p
KA2214	150p
KA2261	100p
KA2263	100p
KA2264	100p
KA2284	100p
KA2401	150p
KA2412	350p
KA2912	125p
KA2914A	300p
LA1130	240p
LA1150	150p
LA1185	150p
LA1201	75p
LA1210	140p
LA1222	80p
LA1230	130p
LA1231	210p
LA1364	200p
LA1365	120p
LA1368	220p
LA1385	170p
LA1460	220p

LA2000	150p
LA2101	270p
LA2200	190p
LA3160	120p
LA3201	80p
LA3210	65p
LA3220	100p
LA3300	140p
LA3301	110p
LA3350	110p
LA3361	100p
LA3375	300p
LA4030	180p
LA4031	140p
LA4032	140p
LA4051	160p
LA4100	85p
LA4101	80p
LA4102	100p
LA4110	120p
LA4112	120p
LA4120	270p
LA4125	200p
LA4126	240p
LA4137	180p
LA4140	80p
LA4160	100p
LA4180	300p
LA4182	180p
LA4190	300p
LA4192	140p
LA4200	130p
LA4201	120p
LA4220	120p
LA4260	230p
LA4261	300p
LA4270	300p
LA4420	140p
LA4422	130p
LA4430	130p
LA4440	230p
LA4445	200p
LA4460	130p
LA4461	130p
LA4500	200p
LA4505	220p
LA4507	360p
LA4508	260p
LA4510	160p
LA4520	230p
LA4550	200p
LA4555	190p
LA4570	150p
LA5112	200p
LA5523	150p
LA5527	150p
LA5700	300p
LA6324	200p
LA7011	220p
LA7031	250p
LA7033	400p
LA7040	280p
LA7042	280p
LA7046	300p
LA7224	150p
LA7505	250p
LA7507	250p
LA7520	200p
LA7620	500p
LA7800	180p
LA7801	100p
LA7802	300p
LA7806	260p
LA7808	250p
LA7820	150p
LA7823	280p
LA7910	150p
LA7940	200p
LC7131	260p
LC7132	400p
LC7137	450p
LF347	110p
LF351	45p
LF353	48p
LF355	60p
LF357	70p
LF398	300p
LM301	26p
LM311	35p
LM319	165p
LM324	30p
LM335Z	120p
LM339	35p
LM348	50p
LM358	45p
LM380	80p
LM381	150p
LM382	130p
LM386	60p
LM387	100p
LM393	45p
LM709DIL	30p
LM710	45p
LM723	40p
LM741DIL	18p
LM741MET	45p
LM747	55p
LM748	30p
LM1458	30p
LM1889	300p
LM3900	40p
LM3909	80p
LM3911	160p
LM3914	180p
LM3915	160p
LM3916	270p
M50115P	320p
M50117P	500p
M50119P	525p
M50784	300p
M50786	500p
M50790	800p
M51161	300p
M51381P	200p
M51387P	900p
M51544	150p
M51848	150p
M54523P	200p
M54563P	200p
M58484	500p
M58655P	400p
M51516	260p
M51518	200p
MB3614	180p
MB3712	140p
MB3713	130p
MB3714	270p
MB3715	250p
MB3722	280p
MB3730	160p
MB3731	220p
MB3756	160p
MB3759	200p
MB8719	360p
MC1455	45p
MC1458	30p
MC1488	50p
MC1489	50p
MC1496	65p
MC3302	70p
MC3401	45p
MC3403	60p

NE555	20p
NE556	40p
NE565	110p
NE566	130p
NE567	115p
NE571	290p
NE592	85p
NE5532P	140p
SAS560	110p
SAA1006	300p
SAA1008	450p
SAA1010	400p
SAA1024	250p
SAA1025	250p
SAA1961	400p
SAA1075	350p
SAA1124	200p
SAA1220	400p
SAA1250	280p
SAA1251	380p
SAA1272	280p
SAA1274	280p
SAA3004	400p
SAA5000	200p
SAA5010	220p
SAA5012	400p
SAA5020	350p
SAA5030	440p
SAA5040A	280p
SAA5040B	400p
SAA5050	650p
SAB3013	200p
SAB3035	600p
STA301A	200p
STA401A	220p
STA403A	270p
STA404	290p
STA405A	280p
STA431A	250p
STA432A	220p
STA434A	270p
STA435A	270p
STA441C	220p
STA456C	240p
STA471	210p
STA901M	280p
STA8012	260p
STK0025	420p
STK0029	360p
STK0039	600p
STK0040	520p
STK0049	510p
STK0050	440p
STK0059	620p
STK0060	820p
STK0070	1100p
STK0080	580p
STK011	370p
STK015	490p
STK016	800p
STK025	700p
STK043	900p
STK050	2200p
STK056	820p
STK077	600p
STK078	620p
STK080	600p
STK082	580p
STK084	660p
STK085	1050p
STK086	870p
STK420	400p
STK430	500p
STK433	490p
STK435	400p
STK436	490p
STK437	500p
STK439	550p
STK441	680p
STK443	740p
STK457	500p
STK459	560p
STK460	720p
STK461	620p
STK463	780p
STK465	720p
STK501	580p
STK561	550p
STK563	480p
STK583	600p
STK734B	510p
STK745	600p
STK760	600p
STK770	750p
STK772B	480p
STK780	850p
STK1039	500p
STK1040	700p
STK1049	800p
STK1050	650p
STK1060	760p
STK1070	940p
STK1080	990p
STK2025	700p
STK2028	560p
STK2029	480p
STK2038	900p
STK2048	950p
STK2110	680p
STK2120	820p
STK2125	650p
STK2129	610p
STK2139	800p
STK2155	950p
STK2230	470p
STK2240	820p
STK2250	760p
STK3041	460p
STK3042	375p
STK3044	525p
STK3062	600p
STK3082	700p
STK3083	550p
STK3102II	600p
STK3152II	990p
STK3156	560p
STK4017	450p
STK4019	600p
STK4021	425p
STK4025	600p
STK4026	600p
STK4028	620p
STK4032II	650p
STK4036	500p
STK4038	680p
STK4042II	900p
STK4044	1000p
STK4046	1100p
STK4048	1280p
STK4060	580p
STK4101	650p
STK4111	850p
STK4112	950p
STK4121	600p
STK4122	560p
STK4131	650p
STK4132II	750p
STK4141II	420p
STK4142	800p
STK4151	680p
STK4152	750p
STK4161	700p
STK4162	650p
STK4171	850p
STK4172II	800p
STK4181	820p

STK4182II	800p
STK4191	850p
STK4192	800p
STK4231II	990p
STK4272	720p
STK4273	650p
STK4301	700p
STK4311	800p
STK4332	410p
STK4352	640p
STK4362	600p
STK4372	570p
STK4392	690p
STK4432	900p
STK4773	900p
STK4793	1100p
STK4803	720p
STK4813	950p
STK4833	810p
STK4843	900p
STK4853	900p
STK4863	850p
STK4873	990p
STK4893	1400p
STK4913	1180p
STK5314	550p
STK5315	600p
STK5322	620p
STK5324	520p
STK5325	400p
STK5331	400p
STK5332	180p
STK5333	550p
STK5335	450p
STK5337	600p
STK5338	350p
STK5339	500p
STK5342	300p
STK5361	420p
STK5372	300p
STK5412	400p
STK5421	525p
STK5422	375p
STK5431	650p
STK5434	650p
STK5436	600p
STK5441	500p
STK5451	480p
STK5457	425p
STK5461	700p
STK5462	675p
STK5466	675p
STK5467	500p
STK5471	400p
STK5473	600p
STK5476	350p
STK5478	500p
STK5479	350p
STK5481	420p
STK5482	300p
STK5483	550p
STK5488	600p
STK5490	500p
STK5725	600p
STK5730	600p
STK6431	850p
STK6722	900p
STK6732	1500p
STK6822	1200p
STK6922	600p
STK6932	600p
STK6962	320p
STK6972	630p
STK6981B	850p
STK6982	800p
STK7216	500p
STK7217	560p
STK7226	800p
STK7308	410p
STK7309	450p
STK7310	550p
STK7348	400p
STK7356	500p
STK7358	500p
STK7402	660p
STK7404	400p
STK7406	800p
STK7408	880p
STK7410	1200p
STK7554	1000p
STK7561	700p
STK7563	950p
STK8050	880p
STK8250	550p
STK8260	1500p
STK8280	1850p
STK73410	350p
STR370	440p
STR371	450p
STR380	400p
STR381	450p
STR383	475p
STR384	400p
STR440	700p
STR441	440p
STR450	520p
STR541	600p
STR452	600p
STR453	600p
STR454	450p
STR455	500p
STR456	600p
STR457	600p
STR470	600p
STR1096	380p
STR1195	450p
STR1229	450p
STR2005	500p
STR2012	500p
STR2013	400p
STR2024	650p
STR2105	600p
STR3113	300p
STR3115	500p
STR3123	490p
STR3125	580p
STR3135	300p
STR3212	330p
STR3214	330p
STR3215	330p
STR3315	330p
STR4142	550p
STR4211	370p
STR4512	450p
STR5015	600p
STR5100	650p
STR5214	550p
STR5315	700p
STR5412	400p
STR6020	400p
STR9005	600p
STR9012	550p
STR10006	550p
STR11006	550p
STR12006	600p
STR13006	650p
STR15006	650p
STR16006	650p
STR20005	550p
STR20012	600p
STR20015	600p
STR30113	400p
STR30115	350p
STR30123	600p
STR30130	400p
STR30134	320p
STR40090	450p

STR41090	500p
STR44111	650p
STR44115	850p
STR45111	700p
STR50020	550p
STR50092	650p
STR50100	650p
STR50103A	260p
STR50113	650p
STR50115	650p
STR51041	650p
STR52041	650p
STR50213	650p
STR53041	650p
STR53043	650p
STR54041	400p
STR55041	650p
STR58041	400p
STR59041	600p
STR60001	650p
STR61001	750p
STR80145	700p
STRD1806	475p
STRD1816	475p
T2800D	52p
TA7054	190p
TA7061	115p
TA7063	70p
TA7066	120p
TA7089	300p
TA7119	150p
TA7120	55p
TA7130	80p
TA7137	83p
TA7140	130p
TA7157	140p
TA7176	200p
TA7193	320p
TA7200	200p
TA7205	80p
TA7207	150p
TA7208	145p
TA7214	260p
TA7217	145p
TA7220	220p
TA7222	120p
TA7223	210p
TA7225	300p
TA7226	290p
TA7227	190p
TA7229	300p
TA7230	120p
TA7232	120p
TA7233	150p
TA7237	400p
TA7238	400p
TA7240	180p
TA7241	190p
TA7242	250p
TA7243	320p
TA7245	350p
TA7267	290p
TA7269	600p
TA7270	200p
TA7271	250p
TA7272	260p
TA7273	350p
TA7274	260p
TA7280	250p
TA7281	220p
TA7282	200p
TA7283	200p
TA7288	220p
TA7299	300p
TA7310	100p
TA7312	120p
TA7313	110p
TA7314	210p
TA7315	200p
TA7317P	240p
TA7324	200p
TA7325	90p
TA7328	150p
TA7335	110p
TA7336	250p
TA7341	250p
TA7343	120p
TA7357	400p
TA7358	120p
TA7401	300p
TA7607	200p
TA7608	360p
TA7609	210p
TA7611	280p
TA7612	360p
TA7614	200p
TA7616	400p
TA7621	520p
TA7622	420p
TA7628	150p
TA7629	220p
TA7630	200p
TA7632	400p
TA7640	150p
TA7641	170p
TA7658	130p
TA7668	160p
TA7680	300p
TA7688	250p
TA7698	500p
TA7699	800p
TA7705	300p
TA7750	200p
TA7757	250p
TA7769	200p
TA7784	250p
TA8205	350p
TA8210	300p
TA8215	300p
TAA550	25p
TBA120S	40p
TBA396	70p
TBA520	120p
TBA530	120p
TBA540	100p
TBA560	120p
TBA800	40p
TBA810AS	60p
TBA820	65p
TBA820M	40p
TBA920	120p
TBA950	100p
TBA990	60p
TC5020	200p
TC5081AP	180p
TC9106	500p
TC9109	450p
TC9122P	430p
TC9125BP	410p
TC9132	400p
TC9134	750p
TC9142	320p
TC9143	300p
TC9145	150p
TC9148	200p
TC149	225p
TC9150	425p
TC9152	425p
TC9153	300p
TC9156	300p
TC9163	375p
TC9164	400p
TC9172P	300p
TC9176P	500p
TCA740	130p
TCA940	100p
TCEP100	100p

TD62308AP	200p
TD62382	200p
TD62506	200p
TD62705	250p
TD6304AP	300p
TD6306P	350p
TD6350P	200p
TD6359P	300p
TDA1001	200p
TDA1002	200p
TDA1003	150p
TDA1005A	220p
TDA1010A	100p
TDA1011	120p
TDA1012	120p
TDA1013A	120p
TDA1015	100p
TDA1016	200p
TDA1020	150p
TDA1022	350p
TDA1023	200p
TDA1024	200p
TDA1025	320p
TDA1028	220p
TDA1029	250p
TDA1035	120p
TDA1037	190p
TDA1044	250p
TDA1048	225p
TDA1053	400p
TDA1054	200p
TDA1060	190p
TDA1062	200p
TDA1072	300p
TDA1074	420p
TDA1082	290p
TDA1083	200p
TDA1085	400p
TDA1097	550p
TDA1151	60p
TDA1154	50p
TDA1170	85p
TDA1180	140p
TDA1190	90p
TDA1200B	80p
TDA1220	150p
TDA1235	350p
TDA1236	295p
TDA1270	150p
TDA1327	250p
TDA1410	219p
TDA1412	100p
TDA1510	380p
TDA1512	200p
TDA1514A	450p
TDA1515A	200p
TDA1516Q	350p
TDA1518	300p
TDA1520	350p
TDA1521	300p
TDA1522	200p
TDA1524	350p
TDA1540	420p
TDA1541	1600p
TDA1596	260p
TDA1670A	300p
TDA1675	250p
TDA1701	320p
TDA1770A	300p
TDA1870A	300p
TDA1872A	450p
TDA1904	120p
TDA1905	150p
TDA1908A	90p
TDA1940	280p
TDA1941	300p
TDA1950	280p
TDA2002	70p
TDA2003	80p
TDA2004	90p
TDA2005	90p
TDA2006	70p
TDA2007	180p
TDA2008	175p
TDA2009	160p
TDA2020	140p
TDA2030	80p
TDA2040	200p
TDA2048	750p
TDA2054M	120p
TDA2151	300p
TDA2170	300p
TDA2270	340p
TDA2320	80p
TDA2510	450p
TDA2532	120p
TDA2540	100p
TDA2541	120p
TDA2542	150p
TDA2543	300p
TDA2545	200p
TDA2556	350p
TDA2575A	100p
TDA2577A	160p
TDA2578A	200p
TDA2579	250p
TDA2582	200p
TDA2590	170p
TDA2593	150p
TDA2594	300p
TDA2595	300p
TDA2600	350p
TDA2611A	100p
TDA2630	300p
TDA2640	220p
TDA2653A	250p
TDA2654	250p
TDA2670	150p
TDA2690	100p
TDA2730	250p
TDA2760	400p
TDA2780	600p
TDA2791	270p
TDA2795	250p
TDA2822M	60p
TDA3047	200p
TDA3048	150p
TDA3082	300p
TDA3083	250p
TDA3190	100p
TDA3300B	480p
TDA3301B	380p
TDA3310	120p
TDA3330	500p
TDA3410	170p
TDA3420	250p
TDA3501	400p
TDA3502	600p
TDA3505	300p
TDA3506	300p
TDA3507	500p
TDA3540	300p
TDA3541	200p
TDA3560	260p
TDA3561	300p
TDA3561A	300p
TDA3562	260p
TDA3563	350p
TDA3565	300p
TDA3566	330p
TDA3580	500p
TDA3586	750p
TDA3590	320p
TDA3591	450p

TDA3592A	350p
TDA3640	350p
TDA3651	200p
TDA3652	500p
TDA3653	150p
TDA3654	150p
TDA3710	320p
TDA3730	550p
TDA3740	600p
TDA3750	400p
TDA3760	470p
TDA3771	460p
TDA3791	400p
TDA3800	350p
TDA3803A	500p
TDA3810	300p
TDA3950	300p
TDA4050	250p
TDA4180	400p
TDA4190	250p
TDA4200	380p
TDA4280	400p
TDA4282	400p
TDA4290	250p
TDA4400	350p
TDA4420	180p
TDA4421	400p
TDA4426	250p
TDA4427	500p
TDA4431	200p
TDA4437	450p
TDA4439	300p
TDA4440	250p
TDA4442	320p
TDA4445	250p
TDA4480	280p
TDA4500	360p
TDA4501	450p
TDA4502	900p
TDA4503	300p
TDA4505	300p
TDA4510	300p
TDA4555	600p
TDA4556	650p
TDA4560	450p
TDA4600	160p
TDA4600-2	200p
TDA4601	160p
TDA4605	300p
TDA4610	400p
TDA4660	480p
TDA4950	180p
TDA5330T	380p
TDA5600	450p
TDA5660P	280p
TDA5700	200p
TDA5708	560p
TDA5709	560p
TDA5800	600p
TDA5820	480p
TDA5850	225p
TDA7000	200p
TDA7010T	120p
TDA7050	200p
TDA7052	150p
TDA7211	150p
TDA7220	150p
TDA7240	300p
TDA7241	250p
TDA7250	600p
TDA7255	600p
TDA7273	100p
TDA7274	100p
TDA7275	75p
TDA7284	100p
TDA8115	300p
TDA8140	300p
TDA8145	150p
TDA8153	370p
TDA8160	150p
TDA8170	300p
TDA8173	325p
TDA8190	280p
TDA8191	425p
TDA8196	150p
TDA8440	380p
TDA8442	280p
TDA8443	400p
TDA8451	800p
TDA8452	280p
TDA9403	250p
TDA9503	200p
TDA9513	350p
TEA1002	850p
TL061	40p
TL064	80p
TL071	38p
TL072	55p
TL074	80p
TL081	40p
TL082	45p
TL083	55p
TL084	70p
ULN2002	70p
ULN2003	69p
ULN2068	270p
ULN2804	170p
UPC20C	220p
UPC554	130p
UPC555	60p
UPC556H	80p
UPC571	220p
UPC574	80p
UPC575C2	90p
UPC576	200p
UPC577	64p
UPC580	300p
UPC592	95p
UPC595	190p
UPC596	190p
UPC1001	120p
UPC1018	170p
UPC1020	200p
UPC1023	60p
UPC1025	230p
UPC1026	95p
UPC1028	90p
UPC1031H	150p
UPC1032	60p
UPC1158H	70p
UPC1177H	250p
UPC1180C	200p
UPC1183	200p
UPC1186	80p
UPC1187	150p
UPC1188H	350p
UPC1197	140p
UPC1198H	200p
UPC1222	130p
UPC1225H	220p
UPC1230	150p
UPC1238	120p
UPC1252H	220p
UPC1263	230p
UPC1270H	250p
UPC1274V	250p
UPC1277	240p
UPC1278	240p
UPC1288V	230p
UPC1298V	320p
UPC1318	300p
UPC1335V	320p
UPC1350	115p
UPC1352	400p
UPC1358H	250p

LINEAR ICs – Cont.

UPC1363	190p
UPC1363C	300p
UPC1364C	350p
UPC1365	250p
UPC1367	500p
UPC1370C	300p
UPC1373	85p
UPC1377C	200p
UPC1378	180p
UPC1382	110p
UPC1384	425p
UPC1387C	250p
UPC1394	120p
UPC1397	350p
UPC-1403CA	650p
UPC-1420CA	450p
UPC-1421CA	650p
UPC-1423CA	550p
UPC1470	200p
UPC1504C	400p
UPC1505C	400p
UPC-1514CA	200p
UPC-1515CA	250p
UPC1520CA	250p
UPC1536C	550p
ZN423	100p
ZN424	100p
ZN425	320p
ZN426	260p
ZN427	560p
ZN429	215p
ZN435	340p
ZN448	510p
ZN459	190p
ZN1040	640p
ZNA134H	2150p
ZNA234E	1250p

JAPANESE TRANSISTORS

2SA473	35p
2SA490	60p
2SA505	120p
2SA509	120p
2SA550	150p
2SA562	50p
2SA603	100p
2SA606	300p
2SA608	15p
2SA634	50p
2SA636	50p
2SA640	60p
2SA673	20p
2SA684	60p
2SA699	100p
2SA708	300p
2SA715	60p
2SA720	20p
2SA725	80p
2SA726	25p
2SA733	30p
2SA747A	600p
2SA748	90p
2SA769	130p
2SA770	200p
2SA771	130p
2SA781	150p
2SA798	55p
2SA814	170p
2SA844	30p
2SA872	40p
2SA872A	50p
2SA886	90p
2SA899	60p
2SA907	650p
2SA909	500p
2SA913	120p
2SA916	30p
2SA921	50p
2SA933	40p
2SA934	40p
2SA935	40p
2SA937	40p
2SA939	140p
2SA940	50p
2SA950	25p
2SA952	50p
2SA953	60p
2SA954	75p
2SA958	70p
2SA965	60p
2SA966	70p
2SA968	70p
2SA970	50p
2SA979	85p
2SA984	50p
2SA992	30p
2SA1006	120p
2SA1008	125p
2SA1009	200p
2SA1010	225p
2SA1011	140p
2SA1012	100p
2SA1013	100p
2SA1015	20p
2SA1016	40p
2SA1018	100p
2SA1020	50p
2SA1021	80p
2SA1023	60p
2SA1026	90p
2SA1029	60p
2SA1036	60p
2SA1037	50p
2SA1038	40p
2SA1048	30p
2SA1051	300p
2SA1052	40p
2SA1060	150p
2SA1069	150p
2SA1076	280p
2SA1077	300p
2SA1081	80p
2SA1082	80p
2SA1084	100p
2SA1085	75p
2SA1091	100p
2SA1093	300p
2SA1094	190p
2SA1095	300p
2SA1096	80p
2SA1102	180p
2SA1103	200p
2SA1104	200p
2SA1105	250p
2SA1106	160p
2SA1111	120p
2SA1112	150p
2SA1115	40p
2SA1123	70p
2SA1124	80p
2SA1127	50p
2SA1133	200p
2SA1141	350p
2SA1142	150p
2SA1143	40p
2SA1145	50p
2SA1152	150p
2SA1156	150p

2SA1162	30p
2SA1169	500p
2SA1170	500p
2SA1175	40p
2SA1184	120p
2SA1186	500p
2SA1198	70p
2SA1206	100p
2SA1208	70p
2SA1209	100p
2SA1210	120p
2SA1215	600p
2SA1216	550p
2SA1217	100p
2SA1220	120p
2SA1227A	300p
2SA1232	250p
2SA1242	80p
2SA1244	120p
2SA1246	80p
2SA1249	100p
2SA1261	150p
2SA1262	160p
2SA1263	280p
2SA1264	280p
2SA1265	280p
2SA1283	60p
2SA1284	60p
2SA1285	60p
2SA1286	60p
2SA1290	150p
2SA1294	450p
2SA1295	500p
2SA1301	250p
2SA1302	300p
2SA1303	400p
2SA1304	110p
2SA1306	110p
2SA1307	160p
2SA1309	50p
2SA1315	100p
2SA1316	80p
2SA1317	30p
2SA1318	30p
2SA1321	80p
2SA1329	200p
2SA1346	30p
2SA1352	100p
2SA1353	100p
2SA1356	100p
2SA1358	130p
2SA1362	100p
2SA1370	100p
2SA1371	100p
2SA1380	100p
2SA1381	100p
2SA1382	120p
2SA1385	180p
2SA1386	400p
2SA1423	30p
2SA1442	200p
2SA1443	250p
2SA1489	200p
2SA1491	300p
2SA1493	500p
2SA1516	380p
2SA1535	175p
2SA1538	80p
2SA483	175p
2SA495	100p
2SA496	100p
2SA537	170p
2SA544	650p
2SA571	650p
2SA614	150p
2SA639	150p
2SA642	50p
2SA677	80p
2SA678	60p
2SA683	70p
2SA706	250p
2SA711	280p
2SA719	50p
2SA764	200p
2SA777	80p
2SA778	100p
2SA786	100p
2SA794	120p
2SA816	150p
2SA817	50p
2SA836	60p
2SA837	270p
2SA839	150p
2SA900	100p
2SA942	60p
2SA949	80p
2SA957	250p
2SA963	120p
2SA985	150p
2SA988	150p
2SA993	50p
2SA999	50p
2SB324	55p
2SB370	45p
2SB546	70p
2SB560	35p
2SB561	50p
2SB562	35p
2SB566	110p
2SB595	80p
2SB596	75p
2SB598	60p
2SB600	500p
2SB646A	90p
2SB647	30p
2SB648	55p
2SB649	40p
2SB688	120p
2SB703	125p
2SB705	200p
2SB707	200p
2SB716	30p
2SB718	70p
2SB727	200p
2SB754	80p
2SB755	310p
2SB772	45p
2SB774	50p
2SB775	100p
2SB791	280p
2SB795	60p
2SB825	135p
2SB861	160p
2SB882	180p
2SB886	225p
2SB950	180p
2SB951	190p
2SB1009	110p
2SB1077	180p
2SB1109	100p
2SC182	75p
2SC369	80p
2SC372	80p
2SC380	20p
2SC382	120p
2SC388A	60p
2SC394	60p
2SC403	80p
2SC454	45p
2SC458	15p
2SC460	10p
2SC461	30p
2SC491	200p
2SC495	60p
2SC496	80p
2SC497	150p
2SC515A	100p
2SC535	50p

2SC536	20p
2SC558	275p
2SC563	120p
2SC603	40p
2SC605	100p
2SC619	100p
2SC641	80p
2SC643	500p
2SC644	25p
2SC647	200p
2SC681	340p
2SC683	120p
2SC708	100p
2SC710	20p
2SC711	40p
2SC717	50p
2SC730	450p
2SC732	40p
2SC733	25p
2SC735	40p
2SC738	40p
2SC739	150p
2SC761	150p
2SC762	150p
2SC783	105p
2SC790	80p
2SC792	380p
2SC806	225p
2SC805A	250p
2SC828	25p
2SC829	20p
2SC839	25p
2SC869	120p
2SC870	100p
2SC898	275p
2SC900B	300p
2SC930	20p
2SC941	25p
2SC943	160p
2SC944	140p
2SC945	20p
2SC950	40p
2SC959	225p
2SC980	120p
2SC982	60p
2SC983	120p
2SC998	600p
2SC1000	60p
2SC1001	950p
2SC1008	50p
2SC1010	225p
2SC1012	75p
2SC1013	170p
2SC1014	140p
2SC1030	190p
2SC1047	60p
2SC1050	280p
2SC1060	90p
2SC1061	85p
2SC1070	65p
2SC1079	250p
2SC1096	60p
2SC1098	120p
2SC1103A	130p
2SC1106	180p
2SC1114	415p
2SC1115	280p
2SC1116	250p
2SC1124	270p
2SC1128	120p
2SC1150	400p
2SC1160	150p
2SC1161	110p
2SC1162	35p
2SC1164	600p
2SC1165	750p
2SC1166	100p
2SC1167	120p
2SC1170	300p
2SC1172	150p
2SC1173	45p
2SC1195	210p
2SC1212	120p
2SC1213	50p
2SC1214	40p
2SC1215	60p
2SC1216	200p
2SC1222	50p
2SC1226	75p
2SC1252	850p
2SC1275	700p
2SC1278	110p
2SC1279	30p
2SC1306	90p
2SC1308K	350p
2SC1312	40p
2SC1317	25p
2SC1318	25p
2SC1325	400p
2SC1327	20p
2SC1328	40p
2SC1342	90p
2SC1343	225p
2SC1345	60p
2SC1346	100p
2SC1358	350p
2SC1359	60p
2SC1360	70p
2SC1364	50p
2SC1383	35p
2SC1384	35p
2SC1390	55p
2SC1393	80p
2SC1394	50p
2SC1398	70p
2SC1400	50p
2SC1403	500p
2SC1407	550p
2SC1413	240p
2SC1419	150p
2SC1424	450p
2SC1426	700p
2SC1429	100p
2SC1444	275p
2SC1446	100p
2SC1447	130p
2SC1448	100p
2SC1449	120p
2SC1450	200p
2SC1454	320p
2SC1470	120p
2SC1471A	400p
2SC1472	40p
2SC1473	70p
2SC1474	125p
2SC1475	60p
2SC1505	80p
2SC1506	75p
2SC1507	140p
2SC1509	45p
2SC1514	65p
2SC1515	60p
2SC1520	120p
2SC1541	110p
2SC1545	120p
2SC1567	140p
2SC1568	75p
2SC1569	140p
2SC1570	40p
2SC1571	50p
2SC1573	50p
2SC1576	450p
2SC1580	600p
2SC1583	30p
2SC1585	270p
2SC1586	540p
2SC1617	340p
2SC1623	50p

2SC1624	140p
2SC1625	150p
2SC1626	75p
2SC1627	60p
2SC1628	75p
2SC1634	50p
2SC1664	300p
2SC1669	100p
2SC1674	50p
2SC1675	200p
2SC1678	120p
2SC1683	100p
2SC1684	45p
2SC1685	60p
2SC1729	900p
2SC1730	40p
2SC1735	70p
2SC1740	40p
2SC1741	45p
2SC1752	70p
2SC1755	90p
2SC1756	40p
2SC1758	30p
2SC1765	1000p
2SC1775	20p
2SC1781	65p
2SC1789	100p
2SC1809	40p
2SC1810	250p
2SC1815	15p
2SC1819	140p
2SC1826	40p
2SC1827	120p
2SC1829	500p
2SC1832	400p
2SC1833	40p
2SC1834	50p
2SC1844	50p
2SC1845	20p
2SC1846	100p
2SC1847	120p
2SC1855	85p
2SC1856	50p
2SC1861	400p
2SC1865	700p
2SC1870	700p
2SC1871	600p
2SC1875	260p
2SC1881	210p
2SC1890	45p
2SC1904	125p
2SC1906	30p
2SC1907	75p
2SC1909	250p
2SC1913	190p
2SC1921	60p
2SC1923	25p
2SC1929	180p
2SC1938	150p
2SC1940	110p
2SC1941	40p
2SC1942	350p
2SC1944	350p
2SC1945	350p
2SC1946	1500p
2SC1947	450p
2SC1955	900p
2SC1957	70p
2SC1959	20p
2SC1962	200p
2SC1966	1150p
2SC1967	1300p
2SC1969	160p
2SC1970	200p
2SC1971	400p
2SC1972	600p
2SC1973	150p
2SC1983	130p
2SC1984	150p
2SC1985	120p
2SC1986	160p
2SC2001	60p
2SC2002	40p
2SC2003	25p
2SC2004	60p
2SC2021	40p
2SC2022	200p
2SC2023	180p
2SC2026	60p
2SC2027	250p
2SC2028	75p
2SC2029	120p
2SC2037	100p
2SC2053	120p
2SC2055	150p
2SC2056	450p
2SC2058	40p
2SC2060	60p
2SC2061	75p
2SC2068	90p
2SC2071	140p
2SC2073	70p
2SC2075	80p
2SC2078	90p
2SC2081	950p
2SC2085	100p
2SC2086	60p
2SC2092	100p
2SC2094	1200p
2SC2097	2200p
2SC2098	600p
2SC2099	2500p
2SC2102	1900p
2SC2118	1100p
2SC2120	50p
2SC2131	550p
2SC2139	350p
2SC2141	150p
2SC2149	500p
2SC2150	400p
2SC2153	70p
2SC2166	80p
2SC2168	175p
2SC2181	2100p
2SC2188	70p
2SC2199	600p
2SC2200	250p
2SC2221	650p
2SC2222	1350p
2SC2228A	60p
2SC2229	25p
2SC2230	80p
2SC2233	100p
2SC2235	60p
2SC2236	30p
2SC2237	600p
2SC2238	70p
2SC2240	25p
2SC2245	1050p
2SC2258	120p
2SC2259	80p
2SC2270	75p
2SC2271	60p
2SC2274	40p
2SC2275	50p
2SC2278	120p
2SC2283	800p
2SC2284	1200p
2SC2287	900p
2SC2290	1800p
2SC2291	125p
2SC2295	60p
2SC2298	120p
2SC2307	500p
2SC2308	40p
2SC2310	50p
2SC2312	300p
2SC2314	70p
2SC2316	150p

2SC2320	40p
2SC2324	120p
2SC2329	480p
2SC2331	150p
2SC2333	200p
2SC2334	240p
2SC2335	120p
2SC2344	150p
2SC2347	60p
2SC2353	120p
2SC2360	120p
2SC2361	150p
2SC2362	50p
2SC2365	500p
2SC2363	6000p
2SC2369	100p
2SC2371	45p
2SC2373	210p
2SC2383	50p
2SC2389	45p
2SC2407	110p
2SC2408	120p
2SC2412K	50p
2SC2413	50p
2SC2429	900p
2SC2431	900p
2SC2437	1000p
2SC2440	350p
2SC2458	40p
2SC2459	50p
2SC2461	400p
2SC2462	50p
2SC2470	65p
2SC2481	120p
2SC2482	40p
2SC2483	120p
2SC2484	240p
2SC2491	200p
2SC2495	1900p
2SC2498	50p
2SC2500	80p
2SC2502	200p
2SC2509	800p
2SC2516	125p
2SC2519	60p
2SC2523	500p
2SC2527	300p
2SC2534	150p
2SC2535	300p
2SC2538	100p
2SC2539	1000p
2SC2540	1900p
2SC2542	300p
2SC2545	55p
2SC2546	75p
2SC2547	65p
2SC2550	70p
2SC2551	70p
2SC2552	150p
2SC2553	200p
2SC2555	150p
2SC2562	90p
2SC2563	200p
2SC2564	230p
2SC2565	260p
2SC2568	120p
2SC2570	80p
2SC2571	350p
2SC2577	125p
2SC2578	220p
2SC2579	130p
2SC2580	240p
2SC2581	290p
2SC2588	600p
2SC2590	75p
2SC2591	140p
2SC2592	200p
2SC2603	40p
2SC2608	800p
2SC2610	85p
2SC2611	40p
2SC2613	250p
2SC2615	400p
2SC2621	90p
2SC2625	380p
2SC2626	600p
2SC2630	1800p
2SC2631	65p
2SC2634	45p
2SC2635	450p
2SC2636	50p
2SC2637	120p
2SC2640	1800p
2SC2653	100p
2SC2654	180p
2SC2655	75p
2SC2656	550p
2SC2660	150p
2SC2665	200p
2SC2668	50p
2SC2671	120p
2SC2681	270p
2SC2682	120p
2SC2688	70p
2SC2690	120p
2SC2694	3200p
2SC2696	2600p
2SC2705	70p
2SC2710	50p
2SC2712	50p
2SC2716	50p
2SC2719	80p
2SC2721	120p
2SC2738	200p
2SC2740	450p
2SC2749	350p
2SC2750	300p
2SC2751	400p
2SC2752	140p
2SC2753	100p
2SC2767	300p
2SC2769	400p
2SC2773	700p
2SC2774	600p
2SC2785	60p
2SC2786	50p
2SC2787	50p
2SC2791	650p
2SC2792	550p
2SC2793	700p
2SC2808	40p
2SC2810	380p
2SC2812	40p
2SC2814	40p
2SC2824	75p
2SC2825	900p
2SC2826	200p
2SC2827	200p
2SC2832	300p
2SC2834	400p
2SC2837	360p
2SC2839	40p
2SC2853	70p
2SC2876	120p
2SC2877	120p
2SC2878	40p
2SC2879	3200p
2SC2883	90p
2SC2898	350p
2SC2899	120p
2SC2901	60p
2SC2909	60p
2SC2911	120p
2SC2912	120p
2SC2915	8200p
2SC2921	650p
2SC2922	610p
2SC2928	550p
2SC2929	280p

2SC2934	75p
2SC2937	250p
2SC2938	400p
2SC2939	400p
2SC2944	620p
2SC2958	75p
2SC2960	60p
2SC2962	800p
2SC2979	160p
2SC2987	325p
2SC2988	250p
2SC2995	60p
2SC2999	50p
2SC3001	1400p
2SC3012	300p
2SC3019	320p
2SC3021	1250p
2SC3025	500p
2SC3026	550p
2SC3030	750p
2SC3037	125p
2SC3038	125p
2SC3039	140p
2SC3040	260p
2SC3042	300p
2SC3057	150p
2SC3058	2500p
2SC3059	900p
2SC3060	1100p
2SC3061	1600p
2SC3066	60p
2SC3070	120p
2SC3074	200p
2SC3075	150p
2SC3077	120p
2SC3086	150p
2SC3089	250p
2SC3098	100p
2SC3099	100p
2SC3101	750p
2SC3102	2800p
2SC3104	1650p
2SC3105	3000p
2SC3112	35p
2SC3114	40p
2SC3116	75p
2SC3117	120p
2SC3122	50p
2SC3130	100p
2SC3133	600p
2SC3148	410p
2SC3149	180p
2SC3150	200p
2SC3151	230p
2SC3152	200p
2SC3153	250p
2SC3156	400p
2SC3157	200p
2SC3158	260p
2SC3159	200p
2SC3164	350p
2SC3169	200p
2SC3170	300p
2SC3173	180p
2SC3175	200p
2SC3178	340p
2SC3179	160p
2SC3181	240p
2SC3182	120p
2SC3199	50p
2SC3209	120p
2SC3210	550p
2SC3211	300p
2SC3212	350p
2SC3225	100p
2SC3244	90p
2SC3246	70p
2SC3257	275p
2SC3259	350p
2SC3260	320p
2SC3261	400p
2SC3262	280p
2SC3263	350p
2SC3264	510p
2SC3266	50p
2SC3268	110p
2SC3269	50p
2SC3270	50p
2SC3277	280p
2SC3280	250p
2SC3281	250p
2SC3284	600p
2SC3293	85p
2SC3296	125p
2SC3298	120p
2SC3299	120p
2SC3300	140p
2SC3303	120p
2SC3306	150p
2SC3307	600p
2SC3309	150p
2SC3316	280p
2SC3317	350p
2SC3318	400p
2SC3320	480p
2SC3327	60p
2SC3331	40p
2SC3333	120p
2SC3336	850p
2SC3345	170p
2SC3346	200p
2SC3352	200p
2SC3353	400p
2SC3355	90p
2SC3356	120p
2SC3358	80p
2SC3361	50p
2SC3376	300p
2SC3377	50p
2SC3378	120p
2SC3383	80p
2SC3387	550p
2SC3393	80p
2SC3399	50p
2SC3400	40p
2SC3401	50p
2SC3402	50p
2SC3409	400p
2SC3412	800p
2SC3416	80p
2SC3417	90p
2SC3419	120p
2SC3420	120p
2SC3422	110p
2SC3423	100p
2SC3446	150p
2SC3447	200p
2SC3450	350p
2SC3456	200p
2SC3457	200p
2SC3459	250p
2SC3460	250p
2SC3461	350p
2SC3466	300p
2SC3467	70p
2SC3468	70p
2SC3481	600p
2SC3482	400p
2SC3486	350p
2SC3502	120p
2SC3503	90p
2SC3504	120p
2SC3505	600p
2SC3506	600p
2SC3507	650p
2SC3509	750p
2SC3518	120p
2SC3519	550p
2SC3526	120p

2SC3531	225p
2SC3547	100p
2SC3549	200p
2SC3552	300p
2SC3568	200p
2SC3583	170p
2SC3584	200p
2SC3595	220p
2SC3596	280p
2SC3604	650p
2SC3605	60p
2SC3606	100p
2SC3607	150p
2SC3608	120p
2SC3631	130p
2SC3636	280p
2SC3651	600p
2SC3657	400p
2SC3659	600p
2SC3668	120p
2SC3675	160p
2SC3678	280p
2SC3679	200p
2SC3680	380p
2SC3685	450p
2SC3687	650p
2SC3688	750p
2SC3691	150p
2SC3692	150p
2SC3705	120p
2SC3715	480p
2SC3717	120p
2SC3719	150p
2SC3729	450p
2SC3743	270p
2SC3746	120p
2SC3747	120p
2SC3752	250p
2SC3769	700p
2SC3781	150p
2SC3783	600p
2SC3787	100p
2SC3789	75p
2SC3790	120p
2SC3795	200p
2SC3798	220p
2SC3807	120p
2SC3811	80p
2SC3832	200p
2SC3833	250p
2SC3853	220p
2SC3854	250p
2SC3855	280p
2SC3857	500p
2SC3858	550p
2SC3870	200p
2SC3883	280p
2SC3890	150p
2SC3895	400p
2SC3897	650p
2SC3907	420p
2SC3909	450p
2SC3927	550p
2SC3946	120p
2SC3950	120p
2SC3953	120p
2SC3954	150p
2SC3973	275p
2SC3975	275p
2SC3987	220p
2SC3996	1200p
2SC4006	100p
2SC4020	280p
2SC4023	325p
2SC4056	350p
2SC4106	200p
2SC4123	450p
2SC4124	250p
2SC4169	60p
2SC4236	550p
2SC4237	750p
2SC4242	200p
2SC4262	50p
2SC4301	550p
2SD198	140p
2SD199	280p
2SD200	210p
2SD201	280p
2SD257	195p
2SD313	40p
2SD315	75p
2SD325	30p
2SD330	110p
2SD348	460p
2SD357	40p
2SD358	40p
2SD371	240p
2SD380	650p
2SD381	80p
2SD388	170p
2SD389	90p
2SD400	14p
2SD401	50p
2SD402	120p
2SD415	120p
2SD424	400p
2SD426	150p
2SD427	350p
2SD438	45p
2SD467	15p
2SD468	25p
2SD471	75p
2SD525	50p
2SD526	70p
2SD545	60p
2SD549	120p
2SD551	400p
2SD555	500p
2SD560	150p
2SD571	80p
2SD575	530p
2SD600	30p
2SD601	40p
2SD602	60p
2SD612	50p
2SD613	70p
2SD636	10p
2SD637	40p
2SD638	60p
2SD639	60p
2SD640	350p
2SD642	50p
2SD655	60p
2SD661	60p
2SD666	70p
2SD667	70p
2SD668	120p
2SD669	40p
2SD673	350p
2SD676	250p
2SD716	80p
2SD717	180p
2SD718	100p
2SD722	240p
2SD725	270p
2SD734	60p
2SD-741	120p
2SD-743	130p
2SD-756	100p
2SD-757	120p
2SD-758	140p
2SD-762	140p
2SD-763	140p
2SD-768	180p
2SD-772	200p
2SD-773	40p
2SD-774	60p
2SD-777	400p
2SD-784	650p

2SD-786	100p
2SD-787	80p
2SD-788	100p
2SD-789	60p
2SD-792	400p
2SD-794	100p
2SD-795A	140p
2SD-811	450p
2SD-819	400p
2SD-820	450p
2SD-821	550p
2SD-822	400p
2SD-826	100p
2SD-836	60p
2SD-836A	60p
2SD-837	80p
2SD-838	400p
2SD-841	160p
2SD-844	200p
2SD-845	250p
2SD-850	260p
2SD-856	48p
2SD-858	250p
2SD-863	60p
2SD-864	200p
2SD-866	120p
2SD-866A	140p
2SD-868	450p
2SD-870	400p
2SD-871	450p
2SD-879	60p
2SD-880	40p
2SD-882	80p
2SD-892A	100p
2SD-894	120p
2SD-895	200p
2SD-896	200p
2SD-900	400p
2SD-905	450p
2SD-916	130p
2SD-917	300p
2SD-921	320p
2SD-923	360p
2SD-946	120p
2SD-947	100p
2SD-950	300p
2SD-951	350p
2SD-957A	520p
2SD-958	60p
2SD-965	100p
2SD-970	170p
2SD-973	60p
2SD-973A	70p
2SD-985	120p
2SD-986	120p
2SD-1012	60p
2SD-1020	40p
2SD-1021	120p
2SD-1022	400p
2SD-1024	130p
2SD-1030	75p
2SD-1031	130p
2SD-1037	750p
2SD-1046	200p
2SD-1047	225p
2SD-1051	130p
2SD-1060	130p
2SD-1062	150p
2SD-1063	200p
2SD-1064	250p
2SD-1065	200p
2SD-1069	150p
2SD-1071	450p
2SD-1073	350p
2SD-1088	150p
2SD-1094	520p
2SD-1110	225p
2SD-1111	60p
2SD-1113	225p
2SD-1128	200p
2SD-1133	100p
2SD-1135	150p
2SD-1138	80p
2SD-1140	40p
2SD-1142	350p
2SD-1148	175p
2SD-1151	50p
2SD-1159	90p
2SD-1160	150p
2SD-1163A	220p
2SD-1164	120p
2SD-1168	425p
2SD-1169	280p
2SD-1173	350p
2SD-1185	400p
2SD-1186	400p
2SD-1187	250p
2SD-1189	125p
2SD-1190	150p
2SD-1191	120p
2SD-1192	90p
2SD-1196	150p
2SD-1197	150p
2SD-1207	50p
2SD-1210	280p
2SD-1211	120p
2SD-1218	75p
2SD-1223	75p
2SD-1225	120p
2SD-1227	40p
2SD-1229	250p
2SD-1237	300p
2SD-1246	30p
2SD-1247	40p
2SD-1248	270p
2SD-1251	180p
2SD-1263	90p
2SD-1264	120p
2SD-1265	75p
2SD-1266	180p
2SD-1267	100p
2SD-1267A	125p
2SD-1271	40p
2SD-1271A	225p
2SD-1272	200p
2SD-1273	50p
2SD-1275	50p
2SD-1276	200p
2SD-1277	190p
2SD-1279	600p
2SD-1288	175p
2SD-1289	300p
2SD-1291	400p
2SD-1292	60p
2SD-1297	425p
2SD-1302	40p
2SD-1308	140p
2SD-1309	140p
2SD-1310	140p
2SD-1313	1000p
2SD-1326	200p
2SD-1328	60p
2SD-1347	70p
2SD-1348	85p
2SD-1350	150p
2SD-1376	125p
2SD-1379	100p
2SD-1380	100p
2SD-1383	100p
2SD-1384	90p
2SD-1389	200p
2SD-1390	350p
2SD-1391	450p
2SD-1392	150p
2SD-1395	150p
2SD-1396	240p
2SD-1397	175p
2SD-1398	130p
2SD-1399	300p

2SD-1400	280p
2SD-1402	280p
2SD-1404	125p
2SD-1406	80p
2SD-1407	160p
2SD-1408	125p
2SD-1409	170p
2SD-1412	100p
2SD-1413	175p
2SD-1414	700p
2SD-1415	190p
2SD-1417	125p
2SD-1425	360p
2SD-1426	160p
2SD-1427	380p
2SD-1428	360p
2SD-1429	410p
2SD-1430	280p
2SD-1431	400p
2SD-1432	400p
2SD-1433	750p
2SD-1438	140p
2SD-1439	270p
2SD-1441	280p
2SD-1445	200p
2SD-1448	140p
2SD-1450	60p
2SD-1451	280p
2SD-1452	350p
2SD-1453	140p
2SD-1455	250p
2SD-1457	220p
2SD-1459	120p
2SD-1468	60p
2SD-1479	200p
2SD-1487	225p
2SD-1491	100p
2SD-1494	300p
2SD-1496	450p
2SD-1497	290p
2SD-1505	120p
2SD-1507	60p
2SD-1509	100p
2SD-1511	100p
2SD-1519	250p
2SD-1521	70p
2SD-1541	350p
2SD-1548	450p
2SD-1554	500p
2SD-1555	350p
2SD-1556	700p
2SD-1564	100p
2SD-1565	75p
2SD-1571	200p
2SD-1572	100p
2SD-1576	450p
2SD-1577	480p
2SD-1579	120p
2SD-1589	100p
2SD-1590	100p
2SD-1591	310p
2SD-1593	125p
2SD-1595	160p
2SD-1604	200p
2SD-1608	210p
2SD-1609	70p
2SD-1630	50p
2SD-1632	500p
2SD-1633	125p
2SD-1637	50p
2SD-1647	50p
2SD-1649	280p
2SD-1650	300p
2SD-1651	270p
2SD-1663	450p
2SD-1664	40p
2SD-1666	120p
2SD-1667	120p
2SD-1668	120p
2SD-1677	300p
2SD-1730	350p
2SD-1732	400p
2SD-1739	350p
2SD-1740	125p
2SD-1748	90p
2SD-1760	80p
2SD-1762	70p
2SD-1773	160p
2SD-1783	100p
2SD-1796	180p
2SD-1815	100p
2SD-1825	120p
2SD-1843	100p
2SD-1846	350p
2SD-1849	325p
2SD-1850	325p
2SD-1858	40p
2SD-1877	250p
2SD-1878	300p
2SD-1879	275p
2SD-1884	300p
2SD-1886	450p
2SD-1887	450p
2SD-1896	300p
2SD-1910	280p
2SD-1911	400p
2SD-1913	50p
2SD-1929	60p
2SD-1939	75p
2SD-1941	500p
2SD-1959	280p
2SD-1961	50p
2SD-1978	50p
2SD-1984	150p
2SD-2012	50p
2SD-2046	50p
2SJ-48	425p
2SJ-49	425p
2SJ-50	425p
2SJ-56	700p
2SJ-74	60p
2SJ-75	280p
2SJ-76	220p
2SJ-77	350p
2SJ-79	225p
2SJ-103	75p
2SJ-106	40p
2SJ-108	60p
2SJ-115	525p
2SJ-116	1000p
2SJ-117	550p
2SJ-118	600p
2SJ-119	700p
2SJ-122	800p
2SJ-161	650p
2SJ-162	680p
2SK-19	45p
2SK-40	50p
2SK-49	50p
2SK-55	100p
2SK-68	100p
2SK-73	75p
2SK-106	40p
2SK-107	40p
2SK-109	120p
2SK-118	50p
2SK-125	100p
2SK-133	650p
2SK-134	415p
2SK-135	415p
2SK-147	160p
2SK-150	150p
2SK-162	115p
2SK-163	40p
2SK-168	40p
2SK-176	800p
2SK-192	45p
2SK-195	150p
2SK-197	140p

2SK-214	170p
2SK-216	200p
2SK-217	35p
2SK-218	400p
2SK-240	140p
2SK-270	50p
2SK-294	350p
2SK-310	200p
2SK-312	750p
2SK-315	70p
2SK-320	120p
2SK-322	140p
2SK-323	130p
2SK-358	300p
2SK-370	40p
2SK-371	40p
2SK-386	600p
2SK-388	850p
2SK-405	450p
2SK-413	500p
2SK-414	500p
2SK-415	500p
2SK-429	180p
2SK-511	450p
2SK-513	325p
2SK-517	200p
2SK-531	350p
2SK-534	700p
2SK-537	900p
2SK-538	450p
2SK-539	1100p
2SK-555	400p
2SK-556	500p
2SK-557	400p
2SK-566	475p
2SK-695	550p
2SK-719	300p
2SK-724	600p
2SK-725	600p
2SK-727	1200p
2SK-735	600p
2SK-758	300p
2SK-787	1100p
2SK-794	500p
2SK-872	950p
2SK-903	500p
2SK-1057	600p
2SK-1058	800p
2SK-45	100p
2SK-51	100p
2SK-59	100p
2SK-73	60p
2SK-74	50p
2SK-77	50p
2SK-81	50p
2SK-85	160p
2SK-87	45p
2SK-88	70p
2SK-121	150p
2SK-129	175p
2SK-165	225p
2SK-166	300p

COMPUTER IC's

2114	150p
2532	200p
2716	100p
2732	200p
2732A	220p
2764	150p
27C64	200p
27128	150p
27256-25	150p
27512	300p
4116	40p
4164-15	80p
4164-12	90p
4164-10	100p
41256-15	80p
41256-12	100p
41256-10	110p
41464-12	150p
41464-10	200p
6116	80p
6264-15	160p
6264-12	200p
6264-10	210p
62256-12	300p
6502	300p
6502A	360p
65C02	930p
6522	280p
6551	380p
6800	210p
6802	220p
6803	500p
6808	500p
6809	500p
6810	150p
6818	380p
6840	290p
6845	200p
6850	90p
8080A	380p
8085A	300p
8086	500p
8088	480p
8156	300p
81LS96	130p
81LS97	130p
81LS98	130p
8224	240p
8226	240p
8243	250p
8250	750p
8251	200p
8253	160p
8255	160p
8256	700p
8257	220p
8271	3400p
8279	270p
8283	400p
8284	440p
8287	280p
8288	650p

8748	700p
8755	800p
Z80ACPU	100p
Z80BCPU	160p
Z80ADMA	200p
Z80APIO	150p
Z80BPIO	150p
Z80ACTC	140p
Z80BCTC	200p
Z80ASIO	210p
Z80ASIO-1	210p
Z80ASIO-2	210p
Z80ADART	260p
74S289	180p
74S387	200p
75107	65p
75110	75p
75113	100p
75122	110p
75150	95p
75154	100p
75162	700p
75182	95p
75183	95p
75188	55p
75189	55p
75195	185p
75451	40p
75454	65p
75492	55p
8T26	95p
8T28	110p

SIMMS

256K×9-80	1000p
256K×9-70	1100p
1MB×9-80	3000p
1MB×9-70	3200p

SIPS

256K×9-80	1100p
256K×9-70	1200p
1MB×9-80	3100p
1MB×9-70	3200p

OPTO COUPLERS

4N25	50p
4N26	50p
4N27	50p
4N28	50p
4N29	90p
4N30	90p
4N31	90p
4N32	100p
4N33	100p
4N36	58p
4N37	58p
4N38	68p

BRIDGE RECTIFIERS

W005 1A/50V	16p
W01 1A/100V	18p
W02 1A/200V	19p
W04 1A/400V	21p
W06 1A/600V	23p
W08 1A/800V	28p
BR81D 2A/100V	33p
BR82D 2A/200V	33p
BR84D 2A/400V	37p
BR86D 2A/600V	43p
BR88D 2A/800V	43p
BR32 3A/200V	43p
BR34 3A/400V	43p
BR36 3A/600V	44p
BR62 6A/200V	80p
BR64 6A/400V	72p
BR251 25A/100V	150p
BR252 25A/200V	165p
BR254 25A/400V	185p
BR256 25A/600V	200p
BR258 25A/800V	240p
BR351 35A/100V	185p
BR352 35A/200V	200p
BR354 35A/400V	220p
BR356 35A/600V	230p
BR358 35A/800V	260p
BY164 1.5A/100V	40p
BY179 1.5A/800V	40p

TRIACS

TIC206D 4A/400V	60p
TIC225D 6A/400V	69p
TIC226D 8A/400V	66p
TIC236D 12A/400V	85p
TIC246D 16A/400V	105p
TIC253D 20A/400V	190p
TIC263D 25A/400V	205p
TI2800D 8A/400V	52p

THYRISTORS

2N5061 0.8A/60V	20p
C106D 4A/400V	28p
TIC116C 8A/300V	59p
TIC116D 8A/400V	70p
TIC116M 8A/600V	79p
TIC126D 12A/400V	75p
TIC 126M 12A/600V	90p
BR103	37p
BR303	85p
BT106	180p
BT116	80p
BT119	100p
TIC44	22p
17088	200p
17089	200p
17127	200p
15/80H	230p
15/85R	230p
SG264	800p
SG613	800p

SERVICE AIDS

SERVISOL PRODUCTS

VIDEO HEAD CLEANER	140p
SWITCH CLEANER	150p
SILICONE GREASE	170p
FREEZE IT	170p
FOAM CLEANER	170p
ANTI-STATIC	170p
AEROKLEANE	140p
AERO DUSTER	170p
PLASTIC SEAL	160p
GLASS CLEANER	160p
COLDKLENE	160p

IF YOU PURCHASE MORE THAN ONE SERVISOL PRODUCT P&P WILL BE CHARGED AT 300p

GRANDATA LTD

K.P. HOUSE, UNIT 15,
POP IN COMMERCIAL CENTRE,
SOUTHWAY, WEMBLEY,
MIDDLESEX,
ENGLAND HA9 0HB
Tel: 081-900 2329 Fax: 081-903 6126

FOR EVEN MORE BARGAINS

SOLDERING IRONS

ANTEX

25 Watt 240V ac SOLDERING IRON (XS25W 240V	£8.00
15 Watt 240V ac SOLDERING IRON (X15W 240V)	£8.00
25 Watt SPARE ELEMENT	£4.50
15 Watt SPARE ELEMENT	£4.50

SOLDERING IRON STAND

SOLDERING STAND (Made by ANTEX)	£3.50
SPARE SPONGE	£0.55

SOLDER

18 SWG 500 GRAMMES	£5.00
20 SWG 500 GRAMMES	£6.50
22 SWG 500 GRAMMES	£7.00

DESOLDERING AIDS

DESOLDER PUMP	£3.20
SPARE NOZZLE	£0.60
SOLDER MOP Standard Gauge 1.2mm	£0.60

VIDEO HEADS

AIWA

AV 66/AV 77	£14.00
G700	£12.00
G900	£22.00

AKAI

VS-105/112/115/116/125/126/201/220/250/301/303/304/205/244/247/248/VSP	£15.00
VP7100/VP77/VS9300/VS9500/9800	£6.50
VP88/VS1/2/4/5/10/VS9700/VSP1	£15.00
VS35/37/38/53/55/56/66/765/767/768	£26.00
VS512/515/516	£28.00
VS465	£30.00
VS11/12	£20.00
VS6/8/9	£30.00
VSX9	£32.00

ALBA

VCR4000/5000/6000	£21.00

AMSTRAD

VCR 4500/5200/9000/TVR1	£11.00
VCR 7000	£11.00
VCR 6000/6100	£13.00
TVR2/TVR3/VCR4600/VCR4600 MKII/VCR4700	£11.50

AUTHENTIC

N850	£8.00

AWA

ATVI	£8.00

BAIRD

8900/8901/8902/8903/8906/8922/8928	£6.50
8904/8923/8924/8925/8929/8935/8941/8943/8944	£6.50
8909/8912	£8.00
8930/8931/8933/8940	£8.00
8942	£23.00
8945	£20.00
8947/8948	£16.00

BAIRD

8950	£17.00

BOSCH BAUER

VRP20	£10.00
VRP25	£10.00
VRP30	£33.50

CANON

VR10	£10.00
VR30A/30B/30E/40A	£33.50

DAEWOD

912	£22.00
VCP 11 RAF	£22.00

DECCA

8300	£10.00
8400/8500	£6.50

FUNAI

E11/VIP1000/VP1400/VCR4000/V1/2S/VCR4500/4800/VCR5200/5600/6400/6600/VIP3000/E1100	£12.00
VCR4600/5400/5800	£12.00
VCR5480/5843	£22.00
VCR6800/6803	£16.00

FISHER

FVHP510/520/530/615/622/710/715/720/721/722/910/FVHP620/711/905/906/908/911/915/916/5000/FVHP420/5005/5050/5075/5001/618/730/830/918	£12.25
VBS3500/7500/7600/9900/VB53500/7100/7600/9900/VBR330	£20.00
VBS7000/VBS7100/VBS9000	£22.00
FVH711/715/721/722/FVHD720	£12.00
FVHP725/830	£25.00
FVHP990	£27.00
FVHP975	£24.00

FIDELITY

HQS200/VCR600/6100	£16.00
VCR100	£12.00
VTR1000	£13.00

GOLDSTAR

8000 3HSSDB	£19.00
GVH51/GVH1221/VCP4000/VCP4100/VCP4200	£18.00
GHV12321/1245/1246/8210/8215/GHVP1240/1241/GHVP1247/1248/VCP400	£16.50

G.E.C.

4000H/4001H/4002H	£16.00
V4001H/V4004	£16.00

GRANADA

CS1/DS2	£21.50
VHSAH1	£13.00
VHSAH3	£31.00
VHSAN3	£8.00
VHSAY3	£14.00
VHSBH1/CH1	£21.00
VHSBP1	£8.50
VHSBY3	£26.00
VHSD52	£16.00
VHSEH2	£21.00
VHSEY1/EY2	£14.00
VHSFG2/FG4	£16.00
VHFS1/FS2	£13.00
VHSTJ1/TJ2/TJ3/WJ3/VHSYJ2	£7.00
VHSVH4/WH1/XH1/YH2	£16.00
VHSWJ1/XJ3	£7.00

GRAETZ

4312/4605/4905/4912/4913/P4833/TR4805/4812/4905/4912/TR4913/4914/4943	£8.50
4935/4943/4963/4985/4993/TR4833/4935/4985/4993	£6.50
4920/4927/4930	£17.00
4946/TR4906/4916	£16.00
TR4994	£23.00
TR4996	£33.00

GRUNDIG

VS410/440/450/460/500/505/510/520/521/530	£17.00
BARCELONA/MVS400/440/500/600/SE5100/6100/TVR4500/VS400/440/500/505/510/518/600/610	£18.00
MADRID/SE5140/VS540/VS5480	£35.00
MVS550/620/630/640	£38.00
VS120	£25.00

HINARI

VXL2/VXL3/VXL4/VXL20/VXL25/VXL35	£11.50
VXL5/V20H	£13.00
VXL6	£18.00
VXL7	£22.00
VXL8/VXL9/VXL10/VXL11/VTV100	£18.50

HITACHI

VT11/VT14/16/30/33/34/330/340/503/640/5030	£12.00
VT7/VT17/VT18/VT19	£23.50
VT35/VT38/VT39	£24.00
VT100/110/111/112/113/115/118/120/125/128/220/225/VT400/405/410/413/414/415/418/510/518/520/525/526/VTM625/626	£16.00
VT3000	£10.00
VT4000/4200/5000/5500	£12.00
VT77/680/3000/6500/7000/8000/8030/8040/8100/8300/VT8500/8700/9000/9300/9500/9700/9900	£12.00
VT8/VT9/VT56/VT57	£34.00
VT65	£26.00
VT130/VT135/VT138/VT145/VT250/VT255/VT258/VT420/425/426/428/430/435/438/535/536/VTL301/VTM630/635/636	£21.00
VT52/61E/VT62E/VT63/VT64/VT640	£15.00
VT150 (4 HEAD)	£27.00
VT530	£25.00

ITT

VR3605/3905/3935/3943/3954/3985/3993	£6.50
VR3833/VR3913/VR3914/VR3963/VR3975/VR3912	£6.50
VR3986	£20.00
VP3826/VR3906/3916/3926/3946/VR3948/6948	£15.75
VR3927	£17.00
VR3976	£24.50
VR3977	£31.00
VR3994	£23.00
VR3995/3997	£31.50
VR3917	£16.00

JVC 3HSS

HR2200/HR3300/HR3320/HR3330/HR3350/HR3360/HR3660/HR3750/HR3860/HR4100	£6.50
3292/8903/89008901/8902/8903/8606/8922/8923/3VO1/3V06/3V22	£6.50
HR3660/HR7600/HR7610/HR7650/HR7700/HRD110/HRD111/HRD120/HRD121/HRD220/HRD225/HRS100	£6.50

FERGUSON 3HSS PIN

8904/8924/8941/8943/8944/3V16/3V23/3V24/3V31/3V35/3V36/3V38/3V39/3V49	£6.50
HRD140/HRD141/HRD143/HRD150/HRD157/HRD158/HRD160/HRD5101/HRS10	£15.50

FERGUSON

8944/8943/3V42/3V44/3V45/3V46/3V47/3V52/3V54/3V55/3V56/3V57	£15.50
8950/8951/3V64/FB10/FV11/3V65/FV20/FV21/FV22/FV26	£17.00
3V48	£24.50
3V43/3V53	£31.50
8930/8940/3V29/3V30	£7.50
8945	£24.00
3V00	£10.00
FV31	£22.00
FV37	£38.00

JVC

HRD170/171/210/211	£17.00
HRD565/566	£24.50
HRD725/HRD755	£31.50
BR7000E/BR7000S	£30.00
HR7200/7300/7350/2650	£7.20
HRD455	£20.00
HRD520	£22.00
HRD300/HRD400/HRD600	£29.00
HR4100	£10.00
HRD750	£33.00
HRD250/257	£27.00

JVC & FERGUSON

3V32/8942/HR7655	£23.00
HRD180/230/3V59/FV12L/FV20B/FV22/26/30/32/33	£30.50
HRD370/3V58/FV13H/HRD430/HRD470	£27.00
HRD530/700/FV14T	£33.50
GRC1/GRC2/3V41	£30.00

LOGIK

VR960	£16.00
VR950	£16.00

LOEWE

OC410/420/440	£24.00
OC50/OC55/OC60/OC65	£15.00

LUXOR

9225	£21.50

MATSUI

VX500E/VX600A/VX800A/VX810A/VX880A/VX770B/VX773B	£13.50
VCRL3/VX730	£15.00
VX735/VX755	£16.00
VX735A/VX755A/VX765/VX850	£17.50

MITSUBISHI

HS303/HS304/HS320/HS700	£16.00
HS306/HS318/HS710	£18.00
HS307	£27.00
HS319	£26.00
HS330	£26.00
HS400	£29.00
HS349	£28.00
HS411	£29.00
HSE30	£24.00
HS338	£24.00
HSE11	£23.00
HS300/HS301/HS302/HS310	£17.00
HS200	£6.50
HS337/HS347	£17.00

NATIONAL PANASONIC 4HSS-3HSSN

NV3000/NV300/NV7200/NV333/NV7500/NV7800/NV7850/NV322/NV332/NV340/NV390/NV2000/NV2010/NV7000/NV8170/NV8200/NV8400/NV8600/NV8610/NV8620	£6.25

NATIONAL

NV777/NV330	£17.00
NV430/AG1000	£11.00
NV280/NV460/470/480	£16.50
NV730/NV770 (4 HEAD)	£18.50
NV336	£18.50
NV180/NVD48	£23.00
NV370/NV380/NV100/NV630	£8.50
NV788	£36.00
NV810/NV830	£27.00

NATIONAL Cont.

NV850/NV950	£30.00
NV870/NV890/NV970	£36.00
NVG33/NVG46/NVL23/NVL25/NVL28	£24.00
NVG30/NVG31/NVG40/NVG130/NVJ30/NVL20	£18.00
NVG10/NVG11/NVG12/NVG14/NVG16/NVG120/NV250/NV280/NV450/NV465	£16.50
NVG18	£22.00
NVG20/NVG21/NVG22/NVG25/NVG28/NVG200/NVD48	£22.00
NVG50/NVG300	£30.00
NVG45/NVG46	£30.00
NVH70	£50.00
NV688	£25.50
NV600	£23.00
AG-6800/6810	£39.00
AG-6100/6200/6300	£32.00
NVH65	£50.00
NVG7/NVG9/NV230	£18.00
NV780	£36.00
NVG15/NVG400	£48.00
NVM7/NVMC20/NVF70	£52.00

N.E.C.

N9011/N9012/N9013E/N9014E/N9014G/N9015/N9016/N901A/N902A/N9033/N9034/N9054/N9063/N9065/N9066/N906A	£20.00
N911A/N915A/N916A/N917	£27.00
PCV754/PV2300/PV2400/PV760/PV794/PV770/PV774/PVC763E	£18.00
N380/N381/N830/N831/N832/N833/N834/N835/N836	£7.00
8261/AH1 (for model DX3000)	£46.00
N895	£31.50

NORDMENDE

460/9-460/V100/V140/V200/V250/V304/V341/V450/V550	£7.00
V1001/V1005/V1015/V1025/V1035/V1041/V1055/V1065/V1105/V2005	£18.00
V110/V333	£20.00
V101/V102/V103/V112/V141/V142/V200/V300/V3005/V300/V301/V302/V350/V500	£7.00
V1205/V1215/V1235/V1245	£20.00
V1305	£33.50
V380	£27.00
V502/V503/V5005	£37.00

ORION

VH3/VH555/VH600/VH700/VH844/VH900/VH1000 (ALL MODELS)	£13.00
VH1/VH2A	£7.00

PHILIPS

VR6460/VR6520/64VR60/VR6420	£8.50
VR6711 4 HEAD	£41.00
6920/VR6440	£58.00
VR6441/VR6540/VR6541/VR6640/VR6642	£14.00

RANK

BV6900AS	£18.00
N830EA/RV300/RV310/RV320/RV330/RV340/RV350/RV380	£7.00

SAISHO

VR100/VR605/VR705/VR805/VR905/VR1000/VR1100/VR1200/VR1600	£12.50
VR3300X/VR3600X/VR3650/VR3800	£14.00
VR3200/VR3500	£15.00
VR2000/VR3300/VR3600	£15.00

SALORA

6500/6600	£21.50
SV7300/8200/8300/9200	£19.50
SV7400/8400	£23.00
SV8100	£13.50

SAMSUNG

SVX301/VB900/VB910/VVT510/VT320/VT5600/VX510/VX511/VX520/VX616/VX626/VX627/VX717/SV716/717/SVX303/305/VB510/520/610/616/617/619/620/626/627/629/710/971/V1520/616/621/626/900/710/VX617/619/629/710/712/VX720/730/970/971/972	£19.00
VB770/V1730/770/VK8220/VX750/770/8225	£21.00

SANYO

VTC5000/VTC5400/VTC6000/VTC6500/VPR5000/VTC1500/VTCM10/VTCM11/VTCM20/VTCM21/VTCM25/VTC2000/VTC5100/VTC5150/VTC5300/VTC5400/VTC5350/VTC5370/VTCNX10/VTCNX15/VTCNX20/VTCNX30/VPR5800	£18.50
VTC5500/VTC5550/VTC9100/VTC9300/VTC9350/VTC9355/VTC9455/VTC9500	£19.00
VHR1110/VHR1150/VHR1300/VHR1700/VHR2300	£16.00
VHR3200/VHR3270/VHR3100/VHR3150/VHR3300/VHR3400/VHR3310/VHRD500	£18.00
VHR1100/VHR1200	£18.00
VHR1500/VHR2500	£28.00
VHR2700	£24.50

SHARP

VC300/VC393/VC496	£3.00
VC488	£48.00
VC779	£20.00
VC789/VC790	£32.00
VC300/VC381/VC383/VC386/VC387/VC388/VC482/VC483/VC486/VC3300/VC8381/VC9100/VC9300/VC9500/VC9700/VC9400/VC9600/VC200/220/384/385/471/477/481	£13.00
VC582/VC583/VC651/VC681/VC750/VC780/VC781/VC683/VC684/402/500/571/673/581/584/585/600/682/685/693/VC700/772/7810/782/7822/783/8481	£13.00
VC6000/VC6200/VC6300/VC7300/VC7700/VC7750/VC8000/VC8300	£20.00
VC793	£36.00
VC473/785/786	£25.00
VC699/VCA501/VCA602	£29.00

SONY

DSR-19R (FOR SL-T 9ME)	£39.00
DSR-21R (FOR SLC 8-C9)	£30.00
DSR-35R (FOR C20/C30/C40/SLF1UB/SLF1E) 2 PIN SLC24PS/SLC33E/SLC44PS/SLF30PF/SLF60PS/SLK85/SLT20ME/SLT30ME	£15.00
DSR-43R (FOR SLC7 RANGE/SL5000/SL5100/SL3000) 1 PIN SLC6E/SL36ES/SL37E	£13.00
SL3000/8000/8080/SLC5E/SLT7ME	£16.00
SLV201/202	£29.50
SLK95/SLT50ME	£29.00

TOSHIBA

V63	£18.00
V9680	£42.00
V8600/V8700	£38.00
V21/V31/V33/V50/V51/V53/V9600	£14.50
V55/V57	£7.00
V71/V73/V74/V75/V81/V82/V83/V84/V85/V86/V87/V80/V77	£14.00
V93/V80	£20.00
V5470/V5480	£18.00

TRIUMPH

VR9500/VR9501/VR9525	£13.00

THOMSON

TX8000/V309/316/320/321/323/326/4100/4200/4300/VK305T/306T/309BL/3301/312T/410T/411T	£6.50
TX8500/V318/342/343/351/352/353/4210/4230/4260	£15.75

VCR PINCHROLLERS

AKAI

VS9300, VS9500, VS9700, VS9800 BP7100, VP77	£2.50
VS1, VS2, VS3, VS4, VS5, VS6, VS9, VS10, VS8, VS15	£2.50
VS105, VS112, VS115, VS116, VS126, VS244, VS245, VS247, VS248, VS515, VS516, VS205	£2.50
VS201, VS301, VS303, VS304, VS603, VS606, VS607, VP58-P82	£2.50
VS125, VS155, VS165, VS220, VS240, VS250, VS512, VSX9	£2.50

AMSTRAD

VCR4500, VCR4600, VCR4600, VCR6000, VCR6100, VCR9000	£2.50
VCR5200	£2.50
VCR7000	£2.50
TVR1	£2.50

AIWA

AV66, AV77	£2.50
G700, G900	£2.50

ALBA

VCR300X, VCR4000	£2.50
VCR5000, VCR600	£2.50

AUTHENTIC

N850	£2.50

BLAUPUNKT

RVT100, 200, 202, 222, 224, 301, 306, 307, RTV309, 311, 312, 315, 316, 317, 319, 320, 328, RTV404, 414, 434, 444, 478, 707, RTX100	£2.50
RTV211, 214, 321, 322, 348, RTX250, 260	£2.50
RTV324, 325	£2.50
RTV330, 454,520, 530, 535, 560, 660, 670, RTV720, 730, 740, 800, 810, 900, 910, 920	£2.50

DECCA

VR8300	£2.50
VRH8495DK (Pressure Roller Assembly)	£4.50

FERGUSON

3V00, 3V16, 3V22, 3V23, 3V24, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922, 8923, 8924, 8925, 8929	£2.50
3V29, 3V30, 3V31, 3V32, 8930, 8931, 8940, 8941, 8942	£2.50
3V35, 3V36, 3V38, 3V39, 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 3V58, 3V59, 3V64, 3V65, FV10, FV11, FV12, FV14, 3V49, 8943, 8944, 8945, 8947, 8948, 8950, 8951, FV13H, FV20B, FV21R, FV22L, FV26D, FV30B, FV32L, FV33H, FC39S, VC141L	£2.50

FISHER

FVHP420, FVHP520, FVHP530	£2.50
FVHP615, FVHP710, FVHP715, FVHP716, FVHP722, FVHP725, FVHP830, FVH618, FVH620, FCH622, FVH622, FVH771, FVH720,FVH721, FVH722, FVH725, FVH730, FVH840	£2.50
FVHP905, FVHP970, FVHP980, FVHP990, FVHP5000, FVHP5005, FVHP5050, FVHP5075, FVHP5100, FVHP905, FVHP906, FVHP908, FVHP910, FVHP911, FVHP915, FVHP916, FVHP918, FVHP975	£2.50
VBR330, VBS3500, VBS7000,VBS7500, VBS7600, VBS9000, VBS9900	£2.50

FIDELITY

HQS200, VCR100, VCR600, VCR6100	£2.50
VTR1000	£2.50

FUJITSU

HS760, VX715, VX720D	£2.50

FUNAI

VA, V2, VCR4000, VCR4500, VCR4530, VCR4600, VCR4800, VCR5200, VCR5400, VCR5840, VCR5843, VCR6000, VCR6600, VCR6800, VCR6803	£2.50
VIP1000, VIP1400, VIP3000	£2.50

GEC

V4004	£2.50

GRANADA

VHSAH1, VHSAH3, VHSVH4, VHSWH1, VHSXH1, VHSYH2	£2.50
VHSAN3, VHSBP1	£2.50
VHSAY3	£2.50
VHSBH1, VHSCH1, VHSFS1, VHSFS2, VHSEH2, VHSEH3	£2.50
VHSBY3, VHSCC1	£2.50
VHSDS2	£2.50
VHSDP1, VHSFP2 (Pressure Roller Assembly)	£4.50
VHSEY1	£2.50
VHSFG2, VHSFG4	£2.50
VHSFJ4, VHSYJ2	£2.50
VHSF63	£2.50
VHSTJ1, VHSTJ2, VHSTJ3	£2.50
VHSWJ1, VHSWJ3, VHSXJ3	£2.50

GRUNDIG

BARCELONA, MADRID, MVS500, MVS550, MVS600, MVS620, 660, SE5110, SE5140, SE6100, SE6160, TVR4500, VS500, VS505, VS510, VS520, VS521, VS530, VS540, VS550, VS600, VS610, VS620, VS630, VS640, VS660, VS680, VS5180, VS5480	£2.50
MVS400, MVS440, VS400, VS410, VS440, VS460	£2.50
VS120	£2.50
VS510	£2.50

GOLDSTAR

GHV1221, GHV1232, GVH1240, GHV1241, GHV1242, GHV1243, GHV1244, GHV1245, GHV1246, GHV51, GHV8210, GHV8215, GHVP1240, GHPV1241, GHVP1247, GHVP1248, GHVP1290, GHVP1291, GHVP1295, GHPV1296, VCP4100, GHV51, GHV8000, GHV8200, VCP4000, VCP4130, VCP4200, VCP4300, VCP4301, VCP4305, VCP4306, VCP4310, VCP4311, VCP4315, VCP4316, VCP4320, VCP4321, VCP4325, VCP4326	£2.50

HINARI

V20H, VXL10, VXL11, VXL19, VXL5, VXL5, CXL7, VXL8, VXL9, VXL90	£2.50
VXL2, VXL3	£2.50
VXL4, VXL20, VXL35	£2.50

HITACHI

VT11, VT14, VT16, VT17, VT19, VT33, VT330, VT34, VT35, VT38, VT39, VT52, VT6500, VT680, VT6800, VT7, VT7000, VT8000, VT8500, VT9700, VT9900	£2.50
VT61, VT62, VT63, VT64, VT65, VT86, VT88, VT110, VT122, VT120, VT128, VT130, VT135, VT138, VT150, VT168, VT220, VM200, VM500, VM600, VT100, VT111, VT113, VT115, VT118, VT125, VT145, VT175, VT225, VT250, VT225, VT258, VT260, VT400, VT405, VT410, VT413, VT414, VT415, VT418, VT420, VT425, VT426, VT428, VT430, VT431, VT435, VT438, VT450, VT498, VT510, VT518, VT520, VT525, VT526, VT530, VT535, VT536, VT540, VT545, VT546, VT548, VT570, VT575, VT576, VT580, VT588, VT640, VT8, VT85, VT86, VT88, VTL30, VTM625, VTM626, VTM630, VTM636, VTM640, VTM645, VTM646, VTS80, VTS85	£2.50
VT3000, VT5000, VT8000, VT9300, VT9500	£2.50

ITT

VR3605, VR3905, VR3935, VR3985, VR3986, VR3993, VR3994, VP3826, VR3906, VR3916, VR3926, VR3946, VR3948, VR3976, VR3995, CR3997, VR6948	£2.50
VR3913, VR3914, VR3943, VR3954, VR3963, VR3984	£2.50
VR3907	£2.50
VR3912	£2.50
VR3917, VR3833	£2.50
VR3929, VR3968 (PRESSURE ROLLER ASSEMBLY)	£6.25

JVC

HR2000, HR3300, HR3330, HR3360, HR3660, HR4100, HR7700, HR7200, HR7300, HR7350, HR7600, HR7610, HR7650, H7655	£2.50
HRD110, HRD111, HRD120, HRD121, HRD140, HRD150, HRD160, HRD225, HRD455, HRD565, HRD725, HRD157, HRD158, HRD170, HRD180, HRD210, HRD230, HRD250, HRD257, HRD300, HRD320, HRD370, HRD400, HRD430, HRD470, HRD530, HRD566, HRD700, HRD750, HRD755, HRD950, HRP50, HRS5000, HRS5500	£2.50

MATSUI

VX850	£2.50

MITSUBISHI

HS200, HS300, HS301, HS302, HS303, HS304, HS310, HS320, HS700, HS330	£2.50
HS306, HS307, HS337, HS338, HS349, HS400, HS411, HS412, HS421, HS710, HSB10, HSB20, HSB30, HSE10, HSE20, HSE30, HSE70	£2.50

NATIONAL

NV100, NV180, NV300, NV333, NV340, NV366, NV600, NV688, NV777, NV788, AG6010, AG6015, AG6100, AG6200, AG6400, AG6810, NV3321	£2.50
NV230, NV370, NV430, NV460, NV730, NV810, NV830, NV850, NV870, NV890, NV2000, NV2010, NV3000, NV7000, NV7200, NV7800, NV8600, NV8610, NV8620, NVG14, AG1000, AG1200, AG1500, AG2100, AG2100, AG2200, NV260, NV280, NV380, NV450, NV465, NV470, NV480, NV630, NV650, NV770, NV780, NV8050, NV8150, NV8200, NV8300, NV8400, NVG15, NVG30, NVG400, NVH70, NVG130	£2.50
NVG7, NVG19, NVG12, NVG18, NVG9, NVG10, NVG11, NVG120, NVG16	£2.50
NVG21, NVG25, NVH65, NVG33, NVG46, NVG50, NVG300, NVG65, NVF70, NVFS1, NVFS100, NVH75, NVJ30, NVL20, NVL23, NVL25, NVL28	£2.50
NVD40, NVD80, NVG21, NVG45	£2.50

NEC

N830, N831, N832, N833, N895	£2.50
PVC2300, PVC2400, PVC740, PVC744, PVC746, PVC760, PVC764, PVC766	£2.50

ORION

VH1, VH2	£2.50
VC150, VC180, VH1000, VH200, VH201, VH205, VH212, VH250, VH254, VH288, VH3, VH300, VH303, VH3030, VH312, VH33, VH3312, VH404, VH704, VH708, VH712, VH770, VH780, VR2948	£2.50
VH300, VH3050, VH2308, VH2400, VH2600, VH2700, VH4300, VLX20, VXL25, VXL30 Etc	£2.50

PHILIPS

VR6460, VR6920	£2.50
VR2020, VR2021, VR2022, VR2023, VR2024	£3.20
VR6711	£2.50
VR6540	£2.50
DV8556, VR6485, VR6485, VR6589, VR6880, VR6948	£2.50
VR445, VR6442, VR6542, VR6843, VR6943	£2.50
DV464, VR2324, VR2300, VR2334, VR2340, VR2530, VR2414, VR2480, VR2486, VR2489, VR2490, VRS2498, VR6462, VR6463, VR6464, VR6560, VR6660, VR6860, VR6861, VR6862, VR6863	£2.50

Pressure Roller Assembly

DV186, DV190, DV286, SV486, DV471, DV582, DV571, DV761, VR6180, VR6182, VR6185, VR6285, VR6290, VR6291, VR6293, VR6362, VR6367, VR6390, VR6391, VR6393, VR6467, VR6468, VR6470, VR6561, VR6570, VR6581, BR6670, VR6676, VR6760, VR6761, VR6762, VR6870, VR6970, VR6975, VR86B1, 62SB7, 68SB4, 71SB4, 72SB8, 92SB31	£4.50

SANYO

VHR1100, VHR1300, VHR1500, VHR2300, VHR1150, VHR1200, VHR2100, VHR2500, VHR2700	£2.50
VTC5000, VTC5150, VTC5500, VTC9300, VTCM10, VTCM20, VTC5150, VTC5350, VTC5400, VTC6000, VTC6500, VTC9100, VRP5800, VTCM11, VTCM21, VTCM31, VTCM50	£2.50
VHR3100, VHR3300, VHR3310, VHR3700, VHRD500, VHRD700	£2.50
VTC3000	£2.50

SHARP

VC381, VC386, VC2300, VC3300, VC7300, VC7700, VC8300, VC9100, VC9300, VC9500, VC9700, VC200, VC2300, VC3300, VC384, VC385, VC388, VC390, VC393, VC6000, VC6200, VC7750, VC800	£2.50

SEE PREVIOUS PAGES FOR MORE ← GRANDATA BARGAINS

VCR PINCHROLLERS Cont.

Sharp Cont.
VC387, VC481, VC483, VC486, VC496, VC581, VC582, VC583, VC585, VC402, VC471, VC473, VC477, VC500, VC571, VC573, VC584, VC5V20E, VCA1031 £2.50
VC651, VC661, VC685, VC750, VC780, VC781, VC785, VC787, VC793, VCT72, VC600, VC682, VC684, VC693, VC699, VC700, VC772, VC7810, VC782, VC7822, VC7282MK2, VC783, VC783, VC786, VC800, VCF3, VCA100, VCA102, VCA104, VCA202, VCA303, VCA211, VCA234, VCA501, VCA602, VCD801, VCD802, VCH852, VCH881 £2.50
VC220 £2.50

SAISHO
VR2000, VC3800 £2.50

SOLARA
SV6500, SC6600 £2.50
SV7300, SV8200, SC8300, SV9200, SC9300 £2.50
SV7400, SV9400, SV8420, SV8500, SV8520, SC8550, SV8600, SV8620, SV8700, SV8710, SC8720, SV8800, SV8830, SV9500, SV9600, SV9810 £2.50
SV8000, SV8100 £2.50

SAMSUNG
SV716, SV717, VB510, VB520, VB610, VB616, VB617, VB619, VB620, VB626, VB627, VB629, VB900, VB910, V1510, V1520, V1611, V1616, V1621, V1626, V1900, V1910, VX510, VX520, VX616, VX617, VX619, VX626, VX627, VX629 £2.50
SVX301, SVX303, SVX305, SVX307, SVX318, SVX322, VB710, VB770, VB8220, VB971, VB8225, V1730, V1770, V1790, V18220, V18225, VX8220, VX710, VX712, VX720, VX730, VX750, VX770, VX790, VX8220, VX8335, VX970, VX971, VX972 £2.50

SIEMEN
FM350, RM352, FM355 £2.50
FM361, FM362, FM363, FM364 £2.50
FM381, FM392, FM394, FM461, FM462, FM464, FM468, FM561 £2.50

SONY
SLC5, SLC6, SLC7, SL3000, SL8000, SL8080, SL8200, SL8600, SL36, SL37, SLJ10, SLT6ME, SLT7ME £2.50
SLC9, SLC20, SLC24, SLC30, SLC33, SLC44, SLHF100, SLF1, SLF11, SLF25, SLF30, SLF60, SLF100, SLJ200, SLF60PS, SLF90E, SLH150, SLHF850, SLK88, SLK95, SLT20ME, SLT30ME, SLT50ME £2.50
BMC100, BMC200, BMC500 £2.50
SLV201, SLV202, SLV301, SLV302, SLV401, SLV402, SLV801, SLV802 £2.50

TOSHIBA
DV80, DV90, DV96, SC97, V200, V201, V202, V205, V207, V300, V309, V500, V509, V55, V57, V61, V63, V65, V66, V67, V700, V71, V73, V74, V75, V77, V81, V83, V85, V86, V93, V94 £2.50
V5470, V5480 £2.50
V91, V951 (Pressure Roller Assembly) £4.50

VCR BELT KITS

AKAI
VP7100, VS9300, VS9500, V9700, VS9800 £1.30
VS1, VS2, VS4, VS5, VS12, VS15, VS53, VP88, V56, V58, V59 £1.90
VS10 £0.65

AIWA
AV66 £1.25
AV77 £1.40
G700 £1.60
G900 £1.80

ALBA
VCR3000X, VCR4000 £1.30

AMSTRAD
TVR123, VCR4600, VCR4700, VCR5200 £1.60
VCR7000 £0.80
VCR6000, VCR6100 £1.80

AUTHENTIC
N850 £1.20

DECCA
VR8300 £1.20
VRH8545DK £0.80

FERGUSON
3292, 3V00, 3V01, 3V16, 3V22, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922 £1.35
3V23, 8923, 8924, 8929 £0.65
3V29, 3V30, 8930, 8931, 8940 £0.90
3V31, 3V32, 8941, 8942 £0.85
3V35, 3V36,3V38, 3V39, 3V49, 8943, 8944 £0.70
3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 57, 8945, 8947, 8948 £0.65
3V58, 3V59, 3V64, 3V65, 8950, 8951, FV10, FV11, FV12, FV13, FV14, FV20, FV21, FV22, FV26, FV30, FV32, FV33 £1.05

FIDELITY
HIS200, VCR600, VCR6100 £1.80
CVR100 £1.60
VTR1000 £1.00

FISHER
VBS7000 £2.45
VBS9000 £1.20
FVHP520, FVHP530, FVHP420 £0.60
FVHP615, FVHP618, FVHP620, FVHP622, FVHP710, FVHP711, FVHP715, FVHP716, FVHP720, FVHP721, FVHP722, FVHP725, FVHP730, FVHP830, FVHP840 £1.00
FVHP905, FVHP906, FVHP907, FVHP908, FVHP910, FVHP911, FVHP915, FVHP916, FVHP918, FVHP5000, FVHP5005, FVHP5050, FVHP5075, FVHPS100 £1.00
VBR339, VBS7500,VBS7600, VBS9900 £1.00
VBS3500 £0.75

FUJITSU
HS760, VX715, VX720D £1.60

FUNAI
V1, V25, VC4600, VC4800, VCR5200, VCR5400, VCR5600, VCR6600 £2.10
VCR4530, VCR5840, VCR5843, VCR6800, VCR680 £1.80
VIP3000, VIP5000 £1.60

GEC
4005 £1.50
V4004 £1.00

GOLDSTAR
GHV1221, GHV1232, GHV1241, GHV1242, GHV1243, GHV1244, GHV1245, GHV1246, GHV1248, GHV51, GHV8000, GHV8210, GHV8215, BCP4100, VCP4130 £0.80
GHV1290, GHV1291, GHV1295, GHV1296, VCP4200, VCP4300, VCP4301, VCP4305, VCP4306, VCP4310, VCP4311, VCP4315, VCP4320, VCP4321, VCP4325, VCP4326, VCP4000 £1.20
GHV1247, GHV8200 £1.50

GRUNDIG
MVS400, MVS440, VS400, VS410, VS440, VS450, VS460 £0.55

HINARI
VXL2 £0.80
VXL7, VXL8, VXL9 £1.80
VXL4, VXL35 £0.70
VXL5, VXL6 £1.60
VXL3, VXL20 £0.90

HITACHI
VT11, VT14, VT17, VT19, VT33, VT34, VT35, VT38, VT39, VT88, VT165, VT330 £1.00
VT5000, VT5500 £1.20
VT7000, VT8000, VT8500 £0.60
VT680, VT6500, VT6800, VT9300, VT9500, VT9700, VT9900 £0.50
VT52, VT61, VT62, VT64, VT65, VT95, VT86, VT640 £1.50
VT3000 £1.50
VT100, VT110, VT111, VT113, VT115, VT118, VT120, VT125, VT128, VT130, VT138, VT145, VT150, VT175, VT220, VT225, VT250, VT225, VT258, VT260, VTL30 £1.50

ITT
VR3605, VR3905, VR3935, VR3954, VR3985 £0.90
VR3813, VR3914 £1.00
VP3826, VR3906, VR3916, VR3926, VR3946, VR3948, VR3976, VR3986, VR3995, VR3997, VR6948 £0.65
VR3927, VR3928, VR3977 £1.40
VR3993, VR3994 £0.85
VR3963 £0.65
VR3912 £1.50
VR3917 £1.50
VR3929, VR3968 £0.85
VR3907 £1.00

JVC
HR3300, HR3330 HR3360.
HR3660, RM4100 £1.30
HR7200, HR7300 £0.70
HR7350, HR7600, HR7610, HR7650, HR7655 £0.75
HR7700 £0.75
HRD110, HRD111, HRD120, HRD121, HRD225 £0.90
HRD140, HRD150, HRD157, HRD158, HRD160, HRD250, HRD257, HRD455, HRD565, HRD566, HRD725, HRD755, HRP50 £0.80
HRD170, HRD180, HRD210, HRD230, HRD300, HRD320, HRD370, HRD400, HRD430, HRD530, HRD700, HRD750, HRD950, HRS5000, HRS5500 £1.10

MATSUI
VX850 £0.75

MITSUBISHI
HS200, HS318, HS319, HS410 £2.00
HS300, HS301, HS302, HS307, HS310 £1.50
HS303, HS304, HS306, HS320, HS330, HS400, HS700 £1.50

NEC
N830, N831, N832, N83 £1.00
N895 £1.30
PVC2300, PVC2400

NATIONAL
NV300, NV332, NV333, NV340, NV366 £1.35
NV600, NV688, NV777, NV788, AG6010, AG6015 £1.00
NV2000, NV2010, NV3000 £1.50
NV7000, NV7200, NV7500, NV7800 £0.95
NV8600, NV8610, NV8620 £1.60
NV230, NV250, NV260, NV280, NV370, NV380, NV430, NV450, NV460, NV465, NV630, NV730, NV770, NV780, NV810, NV830, NV850, NV870, AG1000, AG1200, AG1500 £1.25

PHILIPS
VR6460/VR6920 £1.70
VR9540 £1.00
DV186, DV190, DV286, SV468, DV471, DV562, DV571, DV761, VR6180, VR6182, VR6185, VR6285, VR6290, VR6291, VR6293, VR6362, VR6367, VR6390, VR6391, VR6393, VR6467, VR6468, VR6470, VR6561, VR6570, VR6581, VR6670, VR6676, VR6760, VR6761, VR6762, VR6870, VR6970, VR6975, VR725B8, VR68SB4, VR86SB1, VR925B3 £0.85
VR5442, VR6542, VR6843, VR6943, VR44SB9 £0.70

SAISHO
VR2000 £0.90
VR3800 £0.75

SALORA
SV6500 £1.00
SV6600 £1.50
SV8000 £1.20
SV8100 £0.60
SV8500, SV8520, SV9500 £1.50
SV7300, SV7400, SC8400, SC8420, SV9200, SV9300 £1.20

SAMSUNG
SV16, SV717,V616, V1621, V1626, VX616, VX626, VX627 £0.85
VB520, VB610, VB616, VB617, VB619, VB620, VB626, VB627, VB629, V1510, V1520, V1611, VX510, VX520, VX617, VX619, VX629 £1.00
VB900, VB910, V1900, V1910 £1.10

SANYO
VTC5000, VTC5150, VTC6000, VTC6500, VTCM10, VCTM11, VCTM20, VTCM21, VCTM30, VCTM31, VTCM50 £0.75
VTC5300, VTC5350, VTC5400, VPR5800 £1.00
VTC5500 £0.95
VTC9100, VTC9300 £2.20
VTC1100, VTC1300, VTC1500, VHR1100, VHR1150, VHR1200, VHR1300, VHR1500 £0.90
VHR2100, VHR2300, VHR2500, VHR2700 £1.50

SHARP
VC200, VC381, VC383, VC384, VC386, VC388, VC390, VC393, VC2300, VC8381, VC9100, VC9300, VC9500, VC9700 £1.25
VC6300 £1.50
VC7300, VC7500, VC7700 £1.50
VC8300 £1.50
VC300, VC387, VC471, VC473, VC477, VC481, VC483, VC486, VC488, VC496, VC8481 £1.00
VC402, VC500, VC571, VC573, VC581, VC582, VC583, VC584, VC585, VCF3 £0.90
VC600, VC651, VC681, VC682, VC684, VC685, VC693, VC699, VC700, VC772, VC781, VC782, VC783, VC785, VC786, VC793, VC800, VC7810, VC7822, VC6F3, VC5V3, VCA100, VCA102, VCA103, VCA104, VCA202 £0.70
VC7750, VC8000 £1.50

SONY
SLC6, SL36ES, SLJ10, SLT6ME £1.40
SLC5, SLC7, SL37E, SLT7ME £1.40
SLC9 £1.65
SL8000, SL8080, SL8200, SL8600 £2.00

TOSHIBA
V55, V57 £0.85
V5250, V5280 £2.30
V33, V53, V96, V9600, V9680 £0.85
V61, V63, V65, V66, V67 £1.50

TRIPLERS

UNIVERSAL £4.00
THORN 9000 SERIES £7.50
PHILIPS G9 £6.50
G8 520/550 £6.50
KT3 £4.00
DECCA 100 SERIES £6.50
120/130 £6.50
ITT CVC 20/30 £6.00
CVC 925 £7.50
RANK T20A £6.50
UNIVERSAL TO FIT
20AX TUBE £8.00
30AX TUBE £8.00

DIODE SPLIT TRANSFORMER

LEADS TO FIT CHASSIS CODE:
CTX TYPE £2.50
G11 TYPE £2.50
KT4 TYPE £2.50

VIDEO MOTORS

AMSTRAD
VCR 7000 REEL MOTOR £17.00

AIWA
AV77 CAPSTON MOTOR £25.00

AKAI
VP7100, VS9300, VS9500, VS9800, CAPSTON MOTOR £21.00
VP7100, VS9300, VS9500, VS9800 DRUM MOTOR £19.50

AUTHENTIC
N850 REEL MOTOR £19.00

BLAUNPUNKT
RTV211, RTV214, REEL MOTOR £13.00
RTV325 LOADING MOTOR £8.00

DECCA
VR8300 REEL MOTOR £19.00

FISHER
6VR330, VBS3500, VBS7500, VBS7600, VBS9900 REEL MOTOR £6.30

FERGUSON
PU 45979 CAPSTON MOTOR £21.00
HR3300, HR3660, HR4100, 3V00, 3V01, 3V16, 3V22, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922
PU 5523V CAPSTON MOTOR £19.50
3V35, EV36, 3V38, 3V39, 8943, 8944, HRD110, HRD111, HRD120, HRD121, HRD225
PU 46414 DRUM MOTOR £19.50
HR3300, HR3320, HR3330, HR3360, HR3600, HR3660, HR4100, 3V00, 3V01, 3V16, 3V22, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922
PU 51281V REEL MOTOR £19.00
3V29, 3V30, 3V31, 3V32, 3V39, 8930, 8931, 8941, 8942, HR7200, HR7300, HR7600, HR7610, HR7650, HR7655

FERGUSON & JVC
PU 59635V CAPSTON MOTOR £29.00
3V58, 3V59, 3V64, 3V65, 8950, 8951, FV10B, FV11R, FV12L, FV13H, FV20B, FV21R, FV22L, HRD170, HRD180, HRD230, HRD300, HRD320, HRD370, HRD400
PU 58636W REEL MOTOR £17.00
3V58, 3V59, 3V64, 3V65, 8950, 8951, FV10B, FV11R, FV12L, FV13H, FV14T, FV20B, FV21R, FV22L, HRD170, HRD180, HRD230, HRD300, HRD320, HRD370, HRD400, HRD430, HRD530
LOADING MOTOR £8.00
3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8945, 8947, 8948, HRD140, HRD150, HRD157, HRD158, HRD160, HRD250, HRD257, HRD455, HRD565, HRD566, HRD725, HRD755, HRP50, R73AF
PU60201V CAPSTON MOTOR £34.00
HRD330, HRD330, HRD337, HRD400, HRD520, HRD530, HRD700, HRD750, HRD950, FV14T
HRD140, HRD150 CAPSTON MOTOR £30.00
HRD250, HRD565, HRD566 £30.00
3V29, 3V30 CAPSTON MOTOR 8930, 8931

HINARI
VXL2, VXL4, VXL20, VXL35
LOADING MOTOR £8.00
VXL20 REEL MOTOR £13.50

HITACHI
5578154 CAPSTON MOTOR £20.00
VT57, 61, 62, 63, 64, 65, 640
VT3000 CAPSTON MOTOR £21.00
VT3000 DRUM MOTOR £19.50

ITT
VP3826, VR3906 LOADING MOTOR £8.00
VR3916, VR3926, VR3846, VR3948, VR3076, VR3997, VR6948
VR3912 CAPSTON MOTOR £21.00
VR3912 DRUM MOTOR £19.50
VR3605, VR3905 CAPSTON MOTOR £19.50
VR3935, VR3954, VR3985
VR3913, VR3914 REEL MOTOR £19.00
VR3993, VR3994

MITSUBISHI
288P02801 MOTOR REEL SPOOLING £35.00
HS300, 301, 302, 310
288P02806 MOTOR REEL SPOOLING £31.50
HS303, 304, 320, 330, 700
288PC3401 MOTOR REEL TAKE-UP GEN £21.00
HS303, HS320, HS700

NEC
N830EG, N831EG CAPSTON MOTOR £19.50
N832, N833EG
N895 LOADING MOTOR £8.00

NATIONAL
MYN 135V5L REEL MOTOR £13.00
NV300, NV332, NV333, NV340, NV366
VEM0212 MOTOR REEL GEN NV730/NV770 £30.00
VEM0217 REEL MOTOR NV7000 £19.00
MAX13V9LP CAPSTON MOTOR £30.00
NV300, NV332, NV333, NV340, NV366, NV600

ORION
NEVHL VC150, VC180 REEL MOTOR £13.50
VH201, VH205, VH212, VH250, VH254, VH228, VH3, VH300, VH303, VH312, VH700, VH704, VH708, VH712, VH770, VH774, VH780, VH820, VH844, VH900, VH974, VH1000, VH1204, VH200, VH2004, VH2204, VH3030, VH3050, VH3060, VH4008, VHF2A, VP200, VR2948, VR2949, VR2956, VR2957

ORION Cont.
NVHL, NVHML LOADING MOTOR £8.00
VH250, VH254, VH288, VH300, VH404, VH412, VH512, VH530, VH535, VH600, VH630, VH635, VH640, VH666, VH704, VH730, VH735, VH744, VH770, VH774, VH820, VH844, VH850, VH888, VH893, VH900, VH974, VH1012, VH1204, VH1440, VH1500, VH1660, VH1800, VH2004, VH3030, VH3050, VH3060, VH4010, VH4015, VH4020, VH5010, VH5016, VHF2A, VP220, VR2948, VR2949, VR2956, VR2957, VR2966, VR2980, VXL20, VXL25, VXL30

PHILIPS
VR6540 REEL MOTOR £16.00

SAISHO
VR705, VR805 REEL MOTOR £13.50
VR905, VR2000

SAMSUNG
VB510 REEL MOTOR £11.00

SANYO
4-529V-10800 (RM11) REEL MOTOR
VTC5000, VTC5150, VTC5300 £6.30
VTC5400, VTC6000, VTC6500
VTC3000 CAPSTON MOTOR £25.00

SHARP
RMOTV 1008GEZZ REEL MOTOR £13.50
VC200, VC381, VC384, VC385, VC386, VC483, VC3300, VC8381, VC9100, VC9300, VC9500, VC9700
RMOTV 1007GEZZ REEL MOTOR £16.00
VC300, VC402, VC471, VC477, VC481, VC482, VC488, VC496, VC500, VC571, VC573, VC581, VC582, VC583, VC584, VC5F3, VC8481, VC8581, VC7822, VCA102 CAPSTON MOTOR £32.00
VCA202, VCA234, VCA602

SONY
BHF 1100D CAPSTAN MOTOR £25.00
SLC5, SLC7, SCL37, SL3000

THOMSON
VK300, VK301 CAPSTON MOTOR £21.00
VK302, VK303,VK305, VK3301, VK306, VK302 DRUM MOTOR £19.50
VK303, VK305, VK308, VK3301

TOSHIBA
V55, V57 CAPSTON MOTOR £19.50
V61, V63 LOADING MOTOR £8.00
V71, V73, V74 REEL MOTOR £10.50
V75, V81, V83, V85, V86, V93, V94, V300, V500, V700, DV90
V71, V73, V74 CAPSTON MOTOR £9.50
V75, V81, V83, V85, V700
V86, V93, V94 CAPSTON MOTOR £15.00

CASSETTE HOUSING

GRANADA
VHSDP1 CASSETTE LIFT ASSEMBLY £15.00
VHSVJ2 £26.00

FERGUSON & JVC
3V38, 3V39, 8943, 8944, 8951, 3V35, 3V36, 3V49, HRD110, HRD111, HRD120, HRD121, HRD225 £26.00
3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 8945, 8947, 8948, HRD140, HRD141, HRD150, HRD157, HRD158, HRD160, HRD250, HRD257, HRD455, HRD565, HRD566, HRD725, HRD755 £26.00
8948, 8950, FV10B, FV12L, FV13H, FV14T, FV20B, FV21R, FV22L, FV26, FV395, HRD230, HRD430, HRD530 £26.00
3V58, 3V59, 3V64, 3V65, FV11R, 8950, 8951, HRD170, HRD180, HRD370 £26.00

ITT
VR3605, VR3905 £26.00
VR3916, VR3926, VR2946, VR3948, VR3976, VR3986, VR3995, VR3997, VR6948 £26.00

NATIONAL
NV730 £43.00

NEC
N830EG, N831EG, N832, N833EG £26.00
N895 £26.00

PHILIPS
CASSETTE LIFT ASSEMBLY 69120366 £11.00
DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, VR6285, 6290, VR6291, 6293, 6362, 6367, 6393, VR6467, 6468, 6470, 6561, 6670, VR6760, 6761, 6870, 8970 £11.00

TELEFUNKEN
VR2970 £26.00

THOMSON
V320, V321, V323, V326, V4200, V4300 £26.00
V342, V343, V352, V353, V360, V364, V368, V4210, V4230, V4260, V4400, V5500, V6000, V8540 £26.00

TOSHIBA
V55, V57 £26.00
V65, V66 £26.00

PANASONIC MODE SWITCHES

NV2000, 2010, 7000, 7200, 7800 (VSS0048) £4.00
NV230, 250, 430, 810, 870, 2300, 4300 (VSS0110) £2.50
NV930 (VSS0091) £3.00
NV300, 333, 340, 366, 688, 777, 778 (VSS0060) £4.00
NV6221, 25, NVH65, NVD80 (VSS0175A) £2.50

ON/OFF MAIN SWITCHES

GRUNDIG
PART NO: 29703-29102
USED ON: C7500, C7500TT, C8500, C8502, C8712, C8714, C8884, M66-190, M66-190/89, M70-195, P40-345, ST66-1902, T55-340, V7722
PRICE: £3.25

ITT
PART NO: 13/1074
USED ON: CP0200, 0211F, 0323, 0323/1, 0341/15, 0345F, 0351, 0351/1, 0361, 0361/1, 9350, CT0500, 0500/1/T, 0500T
PRICE: £3.50
PART NO: LFC 005
USED ON: CVC40
PRICE: £3.25

MATSUI/SAISHO
USED ON: MATSUI-2190, SAISHO-FST2130TX
PRICE: £3.50

PHILIPS
USED ON: K30, K35, K40, KT3, KT4
PRICE: £1.50

SONY
PART NO: (POWER SWITCH +REMOTE SWITCH)
USED ON: KV1612 MK1, KV1612 MK2, KV1614, KV2052, KV2056, KV2062, KV2066, KV2212, KV2216, KV2252, KV2256, KV2704, KV2705, KV2706, KV2752PE3, KV2756PE3, KX20PS1, KX20PS2, KX27PS1
PRICE: £3.50
PART NO: (POWER SWITCH +REMOTE SWITCH)
USED ON: KV2022, KV2024
PRICE: £3.50
PART NO: 155482011 (POWER SWITCH)
USED ON: KV1810 MK1, KV1810 MK2, KV1820, KV1822, KV2000 MK1
PRICE: £7.50
PART NO: 155496711 (POWER SWITCH 26mm)
USED ON: KV1400, KV1440, KV2040, KV2060
PRICE: £2.00
PART NO: 155258800 (POWER SWITCH 21mm +REMOTE SWITCH)
USED ON: KV2020
PRICE: £2.50
PART NO: 155277400-21 (FUNCTION SWITCH)
USED ON: KV1612 MK1, KV1612 MK2, KV2052, KV2056, KV2212, KV2215, KV2216, KV2252, KV2256, KV2704, KV2705, KV2706, KV2752PE3, KV2756PE3
PRICE: £0.50
PART NO: 155336300 (FUNCTION SWITCH)
USED ON: VARIOUS
PRICE: £1.00

VIDEO LAMPS

UNIVERSAL VIDEO LAMPS 9V 80mA (310mm WIRES) £0.30
PANASONIC VIDEO LAMPS £0.50
SHARP VIDEO LAMPS £0.50
HITACHI 5381662 (VT63/64)
VIDEO LAMPS £1.35

VIDEO SENSOR LAMPS

AIWA, AKAI, ALBA, AMSTRAD, BLAUPUNKT, FIDELITY, FISHER, FUJITSU, FUNAI, GEC, GOLDSTAR, GRANADA, GRUNDIG, HINARI, HITACHI, ITT, JVC (HRD SERIES), MATSUI, MITSUBISHI, NEC, ORION, NATIONAL, PHILIPS, SAISHO, SALORA, SAMSUNG, SANYO, SHARP, SIEMEN, SONY, TELEFUNKEN, THOMSON, FERGUSON, TOSHIBA
(SENSOR LAMP CODE NO. VL05) £1.80
AKAI, GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912/VRP3833), JVC (HR2200/3300/3330, HR3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, VR5196/10), THOMSON (VK300/305/306/3301), FERGUSON (3V00/3V16/3V22/3V24/3292/8900/8901/8902/8903/8909/8912/8922/8925) £0.30
(CASSETTE LAMP 9V 80mA 310mm WIRES CODE NO: VL01)
BLAUPUNKT, ORION (VH1/2A), NATIONAL (NV2000, NV2010, NV3000, NV8150, NV8200, NV8400, NV8600, NV8610, NV8620), SHARP (VC2300, VC6000, VC6200, VC6300, VC7300, VC7700, VC8000, VC9300) £0.50
(CASSETTE LAMP 6V 150mA CODE NO: VL02)
AKAI (VS10), GRANADA (VHSXJ3), ITT (VR3993, VR3994), JVC (HR2650, HR7600, 7610, HR7650, HR7656), TELEFUNKEN (VR530, VR635, VR539, VR550, VR630, VR650), THOMSON (V309, V316, V357, VK309, VK411, TX8000), FERGUSON (3V31, 8941, 8942) £0.50
(CASSETTE LAMP 9V 80mA 310mm SKEQ CODE NO: VL06)
AUTHENTIC (N850), DECCA (VR8300), GRANADA (VHSTJ3, VHSWJ1, VHSEJ3), ITT (VR3913, 3914, 3963), JVC (HR7200, 7300, 7350, 7700), TELEFUNKEN (VR450, 520, 529, 540, 549, 620, 640, 920, 1920), THOMPSON (V4100, VK308, 309, 312, 410), FERGUSON (3V23, 3V29, 3V30, 8923, 8924, 8929, 8930, 8931, 8940) £0.50
(CASSETTE LAMP 9V 80mA 210mm SKEQ CODE NO: VL07)
GRANADA (VHSAY3), SHARP (VC200, 381, 384, 385, 386, 388, 390, 393, 9300, 9500, 9700) £0.70
(CASSETTE LAMP 5V 115mA CODE NO: VL08)

NATIONAL LINE OUTPUT TRANSFORMER

TLF 146-11B £17.00
TLF 15542F £25.00
TLF 14568F £26.00
TLF 14567F £26.00
TLF 14715F £27.00
TLF 14749B £29.00
TLF 6609B £28.00

CASSETTE DC MOTORS

6V MOTOR £1.70
9V MOTOR £1.70
12V CW MOTOR £1.70
12V CCW MOTOR £1.70
13.2V CCW MOTOR £2.90

CASSETTE TAPE HEADS

MONO HEAD £0.90
STEREO HEAD £1.10
MINI HEAD £2.30
AUTO REVERSE HEAD £2.60

GRANDATA LTD
K.P. HOUSE, UNIT 15,
POP IN COMMERCIAL CENTRE,
SOUTHWAY, WEMBLEY,
MIDDLESEX, ENGLAND HA9 0HB
Tel: 081-900 2329 Fax: 081-903 6126

SONY FLYBACK TRANSFORMERS

Part No.	Models	Price
1-439-216-00	KV-2002E, 2010E, 2200E, 2015, 1820E, 2010SE, KV-2012ME, 2016ME, 2015ME, 2010ME	£14.00
1-439-256-11	KV-2704EC, 2704UB, 2704ET, 2704E(A), 2704E	£35.00
1-439-286-21	KV-2215UB, 2217UB, 2215EI, 2215FE, 2212EX, 2215ET	£30.50
1-439-289-21	KV-2705F, 2705FE, 2705UB, 2705E, 2706UB, 2720EC	£40.00
1-439-303-00	KV-2064EC, 20PS1, 2062ME7, 2056EC, 2060SA, KV-2062E(ESP)	£27.00
1-439-311-00	KV-1440AEC, 1440AS MK2, CPS-14CD3, CPV-14CD2, KTX-1350NF, KTX-1430UB	£20.00
1-439-332-21	KV-2756, 2730EC, 2730FE, 2764EC, 2752UB, 2752F	£36.00
1-439-333-00	KV-1882EC, 1882UB, 1882F, 1882CH, 1882AEB, 1882AM,	
	KV-1862ME3, 1882HK, 1882AS, 16TR1, 882EC(PS), 1770R	£20.00
1-429-363-21	KV-19HT1A, 19FX1MT, 18G2, 1602M7, 1602GE, ADM-16B, KV-2092UB, 2096UB	£22.00

FLYBACK TRANSFORMERS

FERGUSON		
00D-4208-001	TX9	£14.00
00D-4-208-002	TX9	£14.00
00D-4-235-002-01G	TX90	£14.00
00D-4-247-001	TX90	£14.00
00D-4-247-001 HT1	TX90	£14.00
06D-3-093-001	TX100	£14.00
(110) 06D-3-087-001	TX100	£14.00
(110) 06D-3-084-001	TX100	£14.00
06D-3-088-001	TX100	£14.00
GRUNDIG		
29201-019-05		£8.00
29201-024-11		£14.00
29201-024-04		£14.00
PHILIPS		
PS 140-17112	G11	£14.00
PS 140-10306	G90AE	£11.50
PS 140-10353	G90B	£15.50
PS 140-10151	K12	£15.00
PS 140-10263	K30 K30111	£15.00
PS 140-10246	K40	£13.00
PS 140-10247	KT4	£14.00
PS 140-10149	KT2	£9.00
PS 140-10161	KT3	£9.00
PS 140-17033	G8	£10.00
PS 140-17069	G9	£10.00
PS 140-10328	NC3	£14.00
ITT		
	CVC20	£11.50
	CVC25	£11.50
	CVC30	£11.50
HITACHI		
2432981	CPT 1444	£15.00
2434274	CPT 2174, CPT2176	£14.00
	CPT 2178	
OUTPUT TV MODULE	HM6251 (REF 2370551)	£5.50
	HM6232	£8.00

IDLERS & PULLEYS REPLACEMENT

AKAI			
VS1-2, VS4-5, VS15	FF-REW IDLER	M1327773	£4.50
VS3, 6, 12, 56, 58, 59			
VS1-2, VS4-5, VS15	T-UP IDLER	BV327815	£6.00
VS3, 6, 12, 59, 59			
9700	IDLER	BV321979	£6.00
VS125, 126, 155,	IDLER ASSY	MZ366960J2	£11.00
VS165, 240, 244, 245, 247, 248, 250, 512, 515, 516			
VS22, 38, 105, 112, 115, 116, 205, 220			
VP7100, VS9300	T-UP IDLER	PU47752	£4.50
VS9500, VS9600			
VP7100, VS9300	UNLOADING	PU46381	£4.00
VS9500, VS9800	IDLER		
VP7100, VS9300	REW IDLER	PU46380	£6.00
VS9500, VS9800			
VP77, VS10	REEL IDLER	BV327815	£3.00
VP88	IDLER	BV336067	£5.00
VS1, 3, 4, 9, 12	REEL TABLE	BR347731	£5.50
VS15, 58			
VS23, 35, 37, 53, 55	CLUTCH	ML373043	£13.00
VS66, 75, VSA77			
VS9700	FF IDLER	BV321761	£3.20
VS9700	REW IDLER	W321762	£4.25
AMSTRAD			
VCR7000	IDLER	150280	£1.50
TVR1, VCR4500	CLUTCH	150873	£3.75
VCR4600, VC5200, VCR9000			
TVR1, VCR4500	GEAR HOLDER	151284	£3.50
VCR4600, VCR5200, VCR9000			
TVR1, VCR4600	REF CLUTCH		£3.50
VCR5200			
VCR6000, VCR6100	CLUTCH	153202	£3.80
VCR4500, VCR9000	CLUTCH		£4.00
VCR4500, VCR4600	MOD KIT	(TAPE CREASING)	£4.50
VCR4700			
MOD KIT TAPE CREASING FOR AMSTRAD			
VCR4500, 4600, 4700			£3.00
FERGUSON			
3V00, 3V01, 3V16	T-UP IDLER	PU47752	£4.50
3V22, 3292, 8900, 8901, 8904, 8906			
3V16, 3V22	T-UP IDLER	PU49280	£5.50
8903, 8909, 8912, 8922			
3V23, 3V29 3V30,	REEL IDLER	PU48967	£2.50
3V31, 3V32, 3V35, 8923, 8924, 8929, 8930, 8931, 8940, 8941, 8942			
3V23, 3V31	ROLLER ASSY	PU49042A	£4.00
3V29, 3V30, 3V31	T-UP IDLER	51402	£1.25
3V32, 3V35, 3V36, 3V38, 3V39, 3V49, 8930, 8931, 8940, 8941, 8942			
3V29, 3V30, 3V31	T-UP CLUTCH	PU51380	£2.25
3V32, 8930, 8931, 8940, 8941, 8942			
3V35, 3V36, 3V38	REEL IDLER	PU55374	£2.85
3V39, 3V49, 8943, 8944			
3V35, 3V36, 3V38	T-UP CLUTCH	PU55373	£2.00
3V39, 3V49, 8943, 8944			
3V58, 3V59, 3V64	IDLER ARM	PU58645	£2.25
3V65, FV10, FV11, FV12 FV13, FV14, FV20, FV21, FV22, FV26			
FV30, FV32, FV33, 8950, VC141L			
3V42, 3V43	CLUTCH ASSY	PU55822	£13.50
3V43, 3V44, 3V45	CLUTCH ASSY	PU57658	£11.50
3V48, 3V53, 3V54, 3V55, 3V57, 8947, 8948			
3V42, 3V43, 3V44	T-UP CLUTCH	PU56043-1-4	£2.80
3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8947, 8948			
3V42, 3V43, 3V44	SUPPORT CLUTCH	PU56044-1-5	£2.80
3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8947, 8948			
3V00, 3V01, 3V16	LOADING IDLER	PU43681	£4.00
3V22, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909			
8912, 8922			
3V00, 3V01, 3V16	REW IDLER	PU43608	£6.00
3292, 8900, 8901, 8904, 8906			
3V16, 3V22, 8902	IDLER	PU49281	£1.70
8909, 8912, 8922			
3V16, 3V22, 8902	IDLER	PU49283	£1.00
8909, 8912, 8922			

FISHER			
FVH420, 520, 530	FF-REW PULLEY	HI638531	£1.00
FVHP615, 618, 620	COMP. IDLER ASSY	FI1430240400300	£3.30
FVHP622, 710, 711, FVHP720, 721, 722, FVHP725, 730, 830			
FVHP840,905, 906, FVHP908, 910, 911, FVHP915, 916, 918			
FVHP615, 618, 620	GEAR IDLER ASSY	FI1430490400900	£4.50
FVHP622, 710, 711, FVHP720, 721, 722			
FVHP725, 730, 830, FVHP840			
FVHP615, 618, 620	REEL T-UP ASSY	FI1430410400900	£5.50
FVHP662, 710, 711, FVHP720, 721, 722			
FVHP725, 730, 830, FVHP840			
FVHP905, 906, 908,	GEAR IDLER ASSY	FI1430490402400	£4.00
FVHP910, 911, 915, FVHP916, 918			
FVHP975, 980, 990,	IDLER	FI1430420400700	£4.50
FVHP999, 5000, 5005			
FVHP5050, 5075, 5100			
FVHD40, 55, 140	REEL DRIVE ROLER		£6.00
FVHP1, 10, 20			
FVHP975, 980, 990	GEAR		£3.00
FVHP975, 980, 990	CLUTCH	F12430510404200	£9.50
FVHP420, 520, 530	IDLER		£2.80
FVHP420, 520, 530	TAKE UP IDLER		£3.60
FVHP990	LOADING GEAR		£2.00
VBS3500	REEL DRIVE PULLEY		£5.20
VBS3500	IDLER		£3.00
VBS7000	REW IDLER		£1.20
GOLDSTAR			
GHV1221, 1232, 1240	CLUTCH GEAR	435038A	£2.50
GHV1241, 1242, 1243, GHV1244, 1245, 1246, GHV1247, 1248, 8000,			
GHV8200, 8210, 8215, GHVP51, VCP4100, 4130			
GHV1221, 1232, 1240	IDLER		£1.70
GHV1241, 1242, 1243, GHV1244, 1245, 1246, GHV1247, 1248, 8000,			
GHV8200, 8210, 8215, GHVP51, VCP4100, 4130			
HINARI			
VXL3, VXL20	REEL IDLER	40000009	£1.50
VXL2	IDLER		£1.50
VXL4, VXL35	IDLER		£2.75
VXL4, VXL35	CLUTCH		£6.50
VXL4, VXL12, VXL25	LIMITER POST		£1.30
VXL30, VXL35, VTV300			
VXL5, VXL6	CLUTCH		£3.75
VXL5, VXL6	GEAR HOLDER		£2.50
VXL7, VXL8, VXL9	CLUTCH		£3.80
HITACHI			
VT11-33, VT63-64	CLUTCH ASSY	6B79515	£7.50
VT14, 17, 18, 38, 57, 86, 88, 34, 35, 39, 52, 61			
62, 65, 85, 330, 640, VT165			
VT120-220, 100, 110	CLUTCH ASSY	6886824	£7.50
111, 113, 115, 118, 200		6886972	
125, 128, 130, 135, 138, 145, 150, 175, 225, 250,			
255, 258, 260, VTL30			
VT8000-8300, 7000	FF-REW IDLER	6413663	£2.80
VT8500-8700			
VT8000-8300, 7000	PLAY IDLER	6414221	£3.60
VT8500-8700			
VT8000-8300, 7000	FF-REW PULLEY	6383531	£0.80
VT8500-8700			
VT9300-9500, 6500	FF-REW IDLER	8681471	£3.30
VT680, 6800, 9700, 9900			
VT9300-9500, 6500	PLAY IDLER	6861482	£3.20
VT680, 6800, 9700		6861481	
VT 9900			
VT9300-9500, 9700	IDLER	681505	£3.00
VT9900, 6500, 680, 6800	IDLER	587043	£3.80
VT11-33, VT63-64	FF-REW IDLER	6886971	£1.50
VT14, 165, 17, 19, 34, VT36, 38, 39, 52, 61, 62			
VT65, 85, 86, 88, 320, 640			
VT1000, 110, 111, 113	FF-REW ARM	6886792	£2.75
VT115, 118, 119, 120, 125, 128, 130, 135, 138, 145, 150			
VT175, 220, 225, 250, 255, 258, 260, VTL30			
VT400, 405, 410, 413	FF-REW ARM	6897094	£1.30
VT414, 415, 418, 420, 425, 426, 428, 430, 431, 435			
VT438, 450, 498, 510, 518, 520, 525, 526, 530, 535			
VT536, 540, 545, 546, 548, 570, 575, 576, 580, 585			
VT588, VTM625, 626, 630, 635, 636, 640, 645, 646, VTS80, 85			
VT400, 405, 410, 413	CLUTCH BASE	6896951	£3.25
VT414, 415, 418, 420, 425, 426, 428, 430, 431, 435			
VT438, 450, 498, 510, 518, 520, 525, 526, 530, 535			
VT536, 540, 545, 546, 548, 570, 575, 576, 580, 585			
VT588, VTM625, 626, 630, 635, 636, 640, 645, 646, VTS80, 85			
VT3000	T-UP IDLER (LARGE)		£4.50
VT3000	REW IDLER		£6.00
VT680, 6500, 6800	FS-BRAKE	6861505	£3.00
VT9700, 9900			
HITACHI TV			
OUTPUT MUDULE HM 6251			£5.50
OUTPUT MODULE HM 6232			£8
JVC			
HR330, 3660, 4100	T-UP IDLER SML	PU49280	£5.50
HR7200, 7600, 7650	T-UP CLUTCH	PU53462A	£2.25
HR7655, 7300, 7350, 7610			
HR7200, 7300, 7350	REEL IDLER	PU48967	£2.50
HR7600, 7610, 7650, 7655, 7700			
HR7600, 7610, 7650	ROLLER ASSY	PU49042A	£4.00
HR7655, 7700			
HR3300, 3660, 4100	T-UP IDLER LRG	PU47752	£4.50
HR7200, 7600, 7650	T-UP IDLER	PU51402A	£1.25
HR7655, HRD110, HRD111, HR7300, 7350, 7610, HRD120-121, 225			
HRD110, HRD120-121,	T-UP CLUTCH	PU55373	£2.00
HRD225, HRD111,			
HRD110, HRD120-121,	IDLER ARM	PU55374-3-8	£2.85
HRD225, HRD111			
HRD170, 180, 210, 230	IDLER ARM	PU58465	£2.25
HRD320, 370, 400, 430, 470, 530, 700, 750, 950, 3000			
HRS5000, HRS5500			
HRD455, HRD725	CLUTCH MECH	PU55882Z	£13.50
HRD140, 150, 157, 158	CLUTCH MECH	PU57658	£11.50
HRD160, 250, 257, 565, 566, 755, HRP50			
HR3300, HR3330	REW IDLER	PU46380	£6.00
HR3660, HR4100			
HRD140, 150, 157, 158	TAKE UP CLUTCH	PU56043-1-4	£2.80
HRD160, 250, 257, 455, 565, 566, 725 755, HRP50			
HRD140, 150, 157, 158	TAKE UP CLUTCH	PU56044-1-5	£2.80
HRD160, 250, 257, 455, 565, 566, 725, 755, HPR50			
MATSUI			
VX730, 735, 750, 755,	CLUTCH	850A00005	£6.50
VX810, 820, 850, 880, 990			
VX730, 735, 750, 755	LIMITED POST LEVER		£1.30
VX770, 800, 810, 880	ASSY		
VX990			
VX800A, VX900	IDLER REEL		£1.50
VX800A, VX820	REEL UNIT CLUTCH		£3.50
VX850, VX900	ASSY IDLER		£3.50
MITSUBISHI			
HS306, 307, 318, 319,	GEAR ASSY	522B00201	£6.25
HS400, 410, 710			
HS337, 338, 347, 349	IDLER	552B01701	£3.50
HS411, 412, 421, HSB10, HSB20, HSB30, HSE10, HSE20, HSE20, HSE30, HSE70			
HS306, 307, 318, 319	IDLER	641C34301	£2.00
HS400, 410, 710			
HS347, 349, 412	IDLER	522902002	£3.00
HSB10, HSB20, HSB30, HSE10, HSE20, HSE30, HSE70			

MITSUBISHI Cont.			
HS337, 338, 411, 421	IDLER	552B01801	£3.50
HS200	TAKE UP IDLER (LARGE)		£4.50
HS200	UNLOADING IDLER		£4.00
HS200	REWIND IDLER		£6.00
HS306, 307, 318, 319	SUPPLY REEL	522A00101	£3.20
HS400, 410, 710	DISK		
HS306, 307, 318, 319	TAKE UP REEL	522A00102	£3.20
HS400, 410, 710	DISK		
HS320	REEL DISK	522C06301	£3.00
HS337, 338, 411, 421	REEL DISK	522P00601	£5.00
HS300, 301, 302, 310	PULLEY	522C05201	£2.25
HS306, 307, 318, 319	GEAR WHEEL	641D71101	£1.50
HS400, 410, 710			
HS306, 307, 318, 319	GEAR WHEEL	641D71001	£1.50
HS400, 410, 710			
NEC			
N830, N831, N832, N833	TAKE UP CLUTCH		£2.25
N830, N831, N832, N833	TAKE UP IDLER		£1.45
N830, N831, N832, N833	REEL IDLER		£2.85
N895	TAKE UP IDLER SMALL		£6.00
N911, N915, N916, N917	REEL DRIVE PULLEY		£5.50
N9012, 9013, 9014, 9016, 9033, 9034, 9054, 9055, 9066, 9110			
N9510, 9520, 9530, 9610			
NATIONAL			
NV322, NV600, NV688,	IDLER UNIT	VXP0463	£2.75
NV777, NV788, NV332, AG6100, 6200, 6800, 6810			
NV300, NV333, NV340	IDLER ARM	VXL0997	£3.60
NV366			
NV300, NV330, NV333	IDLER UNIT	VXP0401	£0.75
NV340, NV366			
NV300, NV330, NV333	PLAY IDLER	VXP0433	£2.75
NV340, NV366, NV8620			
NV300, NV332, NV333	ACTION GEAR	VDG0016	£0.60
NV340, NV366, NV600, NV777, NV788, NV2000, NV2010, 3000, 7000			
AG6010, AG6015			
NV333, NV688, NV2000	LOADING GEAR	VXP0325	£2.00
NV3000, NV7800			
NV300, NV332, NV333	INTERMEDIATE GEAR	VXG0017	£0.65
NV340, NV366, NV600, NV777, NV788, NV2000, NV2010, 3000, 7000			
AG6010, AG6015			
NV330, NV333, NV340	CAM GEAR	VXG0158	£1.00
NV366, NV777, NV788			
NV230, NV250, NV260	IDLER ARM	VXP0521	£1.70
NV280, NV370, NV380, NV430, NV450, NV460, NV465, NV470, NV480			
NV630, NV650, NV730, NV780, NV810, NV830, NV850, NV870			
NVG7, NVG9, NVG10, NVG11, NVG12, NVG 14, NVG15, NVG16, VG18			
NVG30, NVG400, AG1000, AG1200, 1500, 1810, 2100,			
AG2200, NVH65, NVH70			
NV270, NV430, NV870	CAM GEAR	VDG0200	£1.20
NV730, NV830, NV850, NVG10, NVG12, NVG18			
NV730, NV770	IDLER UNIT	VXP0581	£2.50
NV2000, 2010 3000	IDLER UNIT	VXP0331	£1.00
NV2000, 2010, 3000	IDLER UNIT	VXP0329	£1.00
NV2000, NV3000	CAM GEAR	VDG0069	£1.00
NV7000, 7200, 7800	IDLER UNIT	VXP0344	£1.00
NV7000, 7200, 7800	CLUTCH	VXP0343	£4.00
NV8150, 8200, 8300,	IDLER UNIT	VXP0245	£0.90
NV8400, 8600, 9610, 8620			
NV8200, 9400, 8600	PLAY IDLER	VXP0243	£0.90
NV8610, 8620			
NV8620	CLUTCH	VXP0343	£4.00
NV332, NV600, NV688	IDLER	VXP0488	£3.50
NVG20, NVG21, NGV25	PULLEY UNIT	VXP0767	£5.00
NVG40, NVG45			
NV230, NV250, NV280	WORM WHEEL	VXP0604	£2.00
NV430, NV450, NV460, NV465, NV650, NV730, NV770, NV810			
NV870, NV890, AG1000			
NV370, NV380, NV630	IDLER	VXP0523	£3.50
NV780, NV830			
NV370	CLUTCH GEAR	VXP0595	£1.00
NVG7, NVG11, NVG12	WORM WHEEL	VXP0691	£1.50
NVG14, NVG15, NVG18, NVG30, NVG120, NVG130, NVG400, NVH70			
NV2000, 2010, 3000	LOADING GEAR	VDG0035	£0.60
NV7000, 7200, 7900, 8050			
NV230, NV250, NV370	LOADING GEAR	VXP0520	£1.50
NV430, NV450, NV460, NV630, NV730, NV770, NV780, NV810			
NV830, NV890, NVG7, NVG10, NVG12, NVG15, NVG30, NVG120			
NGV130, NVG400, NVH70, AG1000			
NV230, NV250, NV260	CLUTCH GEAR		£2.50
NV280, NV430, NV450, NV730, NV770, NV810, NV870, NV890			
NVG7, NVG10, NVG11, NVG12, NVG14, NVG15, NVG18, NVG30			
NCG120, NVG130, NVG400, NVH70, AG1000			
NV230, NV250, NV260	LIMITER ROLLER		£1.50
NV280, NV300, NV333, NV340, NV366, NV370, NV430, NV450, NV460			
NV465, NV630, NV650, NV777, NV780, NV788, NV810, NV830, NV850,			
NV870, NV890, NV2000, NV2010, 7200, 7800, NVG7, NVG10, NVG12,			
NVG14, NVG15, NVG18, NVG30, NVG120, NVG130, NVG400, NVH70, AG1000			
ORION			
MULTIPLE MODELS	IDLER	850A200004	£3.50
MULTIPLE MODELS	IDLER	850A200005	£6.50
VH1, VH2A	IDLER		£1.20
VH1, VH2A	IDLER		£1.20
VH1, VH2A	DRIVING GEAR		£0.60
VH1, VH2A	INTERMEDIATE GEAR		£0.65
VC150, VC180, VH200	IDLER		£1.50
VH201, VH205, VH212, VH250, VH254, VH288, VH300, CH303, VH312			
VH404, VH555, VH700, VH704, VH708, VH712, VH780, VHB44, VH900, VH3,			
VH33			
SAISHO			
VR605, VR800, VR900	CLUTCH	850A20000	£6.50
VR1100, 1200, 1600, 2500, 3200, 3300			
VR3500, 3600, 3800	LIMITER POST		£1.30
VR1100, 1200, 1600, 2500, 3200, 3300, 3500, 3600, 3700			
VR905, VR800, VR900	IDLER		£3.50
VR2500, 3200, 3300, 3500, 3600, 3800			
VR705, VR805, VR905	IDLER		£1.50
SANYO			
VHR1110, 1150, 1200	IDLER	143-0-662T-14730	£5.00
VHR1300, 1500			
VTC5000, 5150, 6000	FF-REW IDLER	143-0-741T-20001	£3.00
VTC6500, VTCM10, M11, M20, M21, M30, M31, M50			
VTC9100, VTC9300	IDLER	143-0-551T-01400	£1.20
VTC9300	FF-ROLLER ASSY	143-0-547T-00200	£2.20
VTCM10, M11, M20, M21	REEL DRIVE PULLEY	143-0-662T-10350	£5.00
VTCM30, M31, M50			
VHR2100, 2300, 2500	IDLER	6130374899	£5.00
VHR2700			
VTC5000, 5150, 6000	PULLEY	143-0-662T-01201	£5.20
VTC6500			
VTCM10, M11, M20, M21	PULLEY	143-0-662T-10350	£5.50
VTCM30, M31, M50			
VHR3100, 3300, 3310	REEL DRIVE	143-0-662T-15621	£4.25
VHR3400, 3700, 3800	ROLLER		
VHRD500, VHRD700			
VPR5600, VTC5300	LOADING ROLLER	143-0-661T-03800	£1.00
VTC5400			
VTC3000	FWD LIMITER		£3.50
VTC3000	IDLER		£5.00
SHARP			
	IDLER ASSY	NIDL0005GEZZ	£1.50
	IDLER	NIDL0006GEZZ	£1.50
VC600, 651, 681, 682	IDLER ASSY	NPLYV0107GEZZ	£6.15
VC684, 685, 693, 699, 700, 783, VCEFR, VCBV3			
VC7300, VC7700, 7750	PLAY IDLER KIT	NPLYV0041+ NDA1V1007	£7.50

PLEASE PHONE US FOR TYPE NOT LISTED HERE AS WE ARE HOLDING 5000 ITEMS AND QUOTATIONS ARE GIVEN FOR LARGE QUANTITIES.

Please send £1 P&P and VAT at 17½%. Govt, Colleges, etc. Orders accepted. Quotations given for large quantities. Please allow 7 days for delivery. All brand-new Components. All valves are new and boxed. Prices quoted are subject to stock availability and may be changed without notice. TV & video parts sold are replacement parts.

REMOTE CONTROLS

GRUNDIG

TP160E	1050P
TP200, TP300	1000P
TP400	850P
TP590-600	1050P
TP390, TP610	1050P
TP621	1050P
TP630, TP650	1000P
TP660	1050P
TP661	1050P

HITACHI

CLE800-CLE830	900P
A617402/655602	1000P
A512120/230	1000P
A514790	1000P
A5088470	1000P
A518612	1000P
SCL002	1000P
C2096	1000P
A511940	1000P
655602H	1000P

ITT

IFB13, 14, 15	900P
FS4	850P
RG305	900P
RG306	900P
FS9/1-10/1	900P
VS5 RUK	900P
VS4-1	900P
MULTICONTROL (17C20)	1000P

KORTING

18279, 18396, 18460, 18521 SE	1000P
40540 VTS	1000P

LOEWE

DC11	1000P

MATSUI

010270601	1000P
VX770	1000P

METZ

JAVA COLOR (6890)	1000P
COLOR (7156)	1000P
JAVA (7180)	1000P

MITSUBISHI

939P/03607, 939P/03609	900P

NOKIA

SATELLITE	1000P

NORDMENDE

TC2336	1050P
CMC1, TC3519	1050P

OCEANIC

390C9500	1000P

ORION

RC53	1000P

PANASONIC

EUR51200	900P
TC2200	900P
VSQ0357/NV730	1050P
TNQ1621	1000P

PHILCO

CARVEL, CONCORDE, MERCURY TELESTAR	1000P
TC10	1000P

PHILIPS

RC5002, 5154	900P
KT3 NON TEXT	900P
69117032	1050P
69117194	1050P
RC5991 UNIV	850P
RC3B	900P
KT3 TEXT	900P
RC5352	900P
RC5375	900P
RC5 STANDARD	900P
RC5901	900P
RC5903	900P

SABA

T6772	1000P
TC319-320	1050P
TC356	1050P
TC358	1050P
TC360	1000P
TC365	1000P

SALORA

SERIES L	1000P
86173	1000P

SANYO

RC218, RC222, RC228, RC238	900P
JXGE	1000P
JXDE	1000P
VHR2300	1000P
RC628	1000P

SHARP

G0121CESA, 123CESA, 204, 251	900P

SIEMENS

FC616	1000P
FC631	1000P
FC742	1000P

SONY

RM604, RM605, RM606	900P
32 CHANNEL	900P
RM613	900P
RM632, RM636	900P

TATUNG

FXA	1000P
RC70	900P
FX70 FASTTEXT	850P

TELEFUNKEN

FB632	1000P
FB639	1000P

THORN/FERGUSON

3V35-42	900P
3V31-32	900P
3V57-58	1050P
TX10 TEXT	850P
TX10 STEREO TEXT	850P
TX9-90-100	850P
3V55, FV11	1050P
TX100 FASTTEXT	900P
TX100 STEREO FASTTEXT	900P
PROFESSIONAL	850P

TOSHIBA

CT937	1000P
CT9117	1000P
201R4B	1000P

UNIVERSAL PROGRAMMABLE REMOTE CONTROL
Controls up to 4 different devices which use infra red remote controls including TV, audio, VCR and satellite. (Need original remote control to program)
Order code: IR100R Price: 1950P

We stock Remote Controls for over 5000 different models. Ring for further details on 081-900-2329.

BACKUP BATTERIES

REPLACEMENT PHILIPS NI-CAD BACKUP BATTERIES
Replaces Philips Part No's:
138-10138, 138-10313. 1.2V – 90mAh 160P
Replaces Philips Part No's:
138-10229. 2.4V – 90mAh 240P

REPLACEMENT FERGUSON NI-CAD BACKUP BATTERIES
Replaces Ferguson Part No: 00E6-067-001. 1.2V
Used on: TX10 150P
Replaces Ferguson Part No's: 00E6-066-001. 2.4V
Used on: 3V35, 3V56, 3V58, 3V65 280P

LINE OUTPUT TRANSFORMERS

Description	Price	Order Code
HITACHI 2433752	1500P	LOT01
ORION 3714002	1500P	LOT02
FIDELITY ZX300	1500P	LOT03
FE TX100 90 DEG	1500P	LOT04
SABA 490007182	1500P	LOT05
FE TX90 WHITE	1650P	LOT06
ITT D307/37 EQ	1600P	LOT07
BLAUPUNKT 210	1600P	LOT08
GRUNDIG 2922010	1600P	LOT09
ITT CVC800/1/3	1500P	LOT10
ITTD218/37 EQ	1600P	LOT11
NORMENDE 5255	1600P	LOT12
SABA 81000 200	1600P	LOT13
SALORA T236 EQ	1650P	LOT14
SABA 811-50-24	1600P	LOT15
SABA 770223500	1600P	LOT16
TELEFUNKEN AT1	1450P	LOT17
TELEFUNKEN EQ	1400P	LOT18
SALORA FM0218B	1600P	LOT19
NORMENDE 5255	1600P	LOT20
ITT CVC 1150/1	1500P	LOT21
ITT COMPACT 80	1500P	LOT22
FE TX100 GREEN	1450P	LOT23
HINARI CT4/5 5113	1500P	LOT24
SELECO 6320410	1600P	LOT25
BLAUPUNKT 8667	1600P	LOT26
ITT COMPACT B1	1450P	LOT27
ITT CT3326 MUL	1500P	LOT28
ITT D066/37 EQ	1600P	LOT29
ITT 3546 EQ	1500P	LOT30
LUXOR 5810110	1600P	LOT31
SABA 849380920	1600P	LOT32
HITACHI 2434141 CP	1450P	LOT33
FE TX100 110 D	1700P	LOT34
HANTAREX 28021	1600P	LOT35
SHARP C3700 EQ	1600P	LOT36
HITACHI 2432981 CP	1500P	LOT37

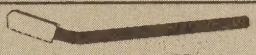
We stock line output transformers for over 100 different models. Please ring 081-900 2329 for more information.

FAULT FINDING GUIDE BOOK

Video Recorders Edition 2
Lists more than 2200 faults for 43 different brands
Price: £9 45p Only. No VAT
Order Code: BOOK01

Television Edition 3
Lists more than 3500 faults for 50 different brands
Price: £9 45p Only. No VAT
Order Code: BOOK02

VIDEO HEAD CLEANING STICKS



Order Code: SP14
Price: 17p Each
15p Each Pack of 10pcs
13p Each Pack of 25 pcs

FUSES

	TIME LAG (20mm)		QUICK BLOW (20mm)	
Value	Order Code	Price	Order Code	Price
160mA	FUSE01	75P	FUSE17	60P
250mA	FUSE02	75P	FUSE18	60P
315mA	FUSE03	75P	FUSE19	60P
400mA	FUSE04	75P	FUSE20	60P
500mA	FUSE05	75P	FUSE21	60P
630mA	FUSE06	75P	FUSE22	60P
800mA	FUSE07	60P	FUSE23	60P
1A	FUSE08	60P	FUSE24	60P
1.25A	FUSE09	60P	FUSE25	60P
1.6A	FUSE10	60P	FUSE26	60P
2A	FUSE11	50P	FUSE27	60P
2.5A	FUSE12	50P	FUSE28	60P
3.15A	FUSE13	55P	FUSE29	50P
4A	FUSE14	55P	FUSE30	50P
5A	FUSE15	60P	FUSE31	50P
6.3A	FUSE16	60P	FUSE32	50P

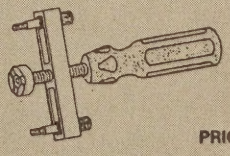
CERAMIC PLUG TOP

3A	FUSE33	100P
5A	FUSE34	100P
13A	FUSE35	100P

ALL THE ABOVE PRICES ARE FOR PACKS OF 10 FUSES

Solder Mop 1.2mm×10 metres	300P
Tubed Silicon Grease 50 gram	200P
Tubed Heat Sink Compound 25 gram	150P

UNIVERSAL HEAD EXTRACTOR TOOL
Hand tool designed for extracting hard to remove heads without damage to either the head or the mounting assembly. Adjustable so as to suit various brand heads.



PRICE – £7

GRANDATA LTD
K.P. HOUSE, UNIT 15,
POP IN COMMERCIAL CENTRE,
SOUTHWAY, WEMBLEY,
MIDDLESEX, ENGLAND HA9 0HB
Tel: 081-900 2329 Fax: 081-903 6126

JUST ARRIVED

VIDEO HEADS

AKAI
VSF600, VSF650 3800P
VP7100, VP7200, VP77 1500P
VS155, VS165 2600P
VS20, VS22, VS24, VS25, VS26, VS27, VS422, VS425, VS426, VS427, VSF10, VSP8, VSP9 1700P
VS240, VSP82, VS202 1500P
VS33 2600P
VSR9 1700P

AMSTRAD
VCR8800, VCR8804, VCR9340 2400P
DD8900, DD8904, TVR4, VCR6200, VCR8600, VCR8602, VR8700 1300P
VCR8603, VCR8604, VCR8704, VCR8714 1350P

BAIRD
VC14L 3000P
VHS82 7000P

BLAUPUNKT
CR1000, CR1200, CR1500 4650P
CR1800 4100P
RTV321, RTV322 1700P
RTV330 2300P
RTV333 1000P
RTV33B 2800P
RTV348 2700P
RTV404, RTV414 3000P
RTV635 3000P
RTV640 3000P
RTV750, RTV800, RTV900 3500P
RTV810 4400P
RTV910 4500P

JVC
HRD330, HRD337, HRD440, HRD637, HRD641, HRD660, HRFC100 2200P

JVC AND FERGUSON
8902/8903/8909/8912/8922 1000P
8923/8925/8929/8935 650P
8931/8933 750P
FV43H, HRD860 3800P
VC141L, HRD190, HRD610 3050P
FV44L 2200P
BR1600, HRD142, HRD156, HRD152 1550P
BR6200 720P
HRD154, HRD217, HRD321, HRD350, HRD521, HRD522, HRD525, HRD527, HRD550 1700P
HRD580, HRD620, HRD650 2900P

FIDELITY
VR900, VR910 1600P

FISHER
FVHD140, FVHD40, FVHP1, FVHP10, FVHP20 FVHP40, FVHS10 1600P
FVHP200, FVHP210, FVHP300, FVHP310 2100P
FVHP500, FVHP5100, FVHP730, FVHP830 1200P
FVHP980 2500P

FUNAI
E1100, VIP5000 1200P
VCR5840, VCR8007, VIP2500A, VIP3000A, VIP6000, VIP150 2200P
VCR4530, VCR6000, VCR6100 1600P
VCR8103, VCR600, VCR6100 1600P
VCR8103, VCR8107 2200P
VIP300A MKII 1900P

GEC
V4005H 2000P

GOLDSTAR
GHV1232, 1233, 1241, 1242, 1243, 1244, 1290, 1291, 1295, 1296, 1891, VCP4130, 4300, 4301, 4305, 4306, 4310, 4311, 4315, 4316, 4320, 4321, 4326 1650P

GRUNDIG
VS456 1700P
SE6110, SE9100, TVR4510, TVR5510, VS500, VS510, VS5180, VS6190, VS700, VS900 1800P
VS790, VS930, VS940 3800P
MVS660, SE6160, VERONA, VS660, VS6690 3500P
MVS710, MVS720, MVS910, SE9120, VS800, VSB10, VS910, VS920, SE7120, VS710, VS720 1800P
VS160, VS740 4400P
VS170 4600P
VS680 4600P

HINARI
VCR34H, VTV200, VXL90 1850P

HITACHI
VT15, VTP10, VTP30 1100P
VT16B, VT260, VT498 2700P
VT570, VT575, VT576, VT580, VT585, VT588 3400P
VT5600 1200P
VT60 1500P
VT660E 2600P
VT6700, VT6800 1200P
VTL30 2100P
VT522, VTM620, VTM622, VTM720, VTM722, VTM822 2000P
VTM725, VTM726, VTM72B 1600P

ITT
VR3520, VR3701, VR3719, VR3720, VR3721, VR3759, VR9720 2000P
VR3730, VR3731, VR3749, VR3907, VR3908 1600P
VR3918, VR3919, VR3938 1800P
VR396B 7000P
VR3984 2300P
VR3958, VR4993 650P
VR4913, VRP3833 650P

LUXOR
9245, 9251, 9254 1225P
9255, 9256 2150P
9270, 9271, 9273 1800P
9272, 928217 2700P
9252 2500P
928017, 928077, 928097, 929107, 929117 1700P
9253 2500P
9281 2700P
9284, 9295, VR3701, VR3721, VR3731, VR3761 2100P

MATSUI
VX600 1100P
VX750 1500P
VX990 1600P

MITSUBISHI
HSE12, HSE22, MX1 2400P
HS411EZ, HS411GZ 2900P
HS273 1700P
HSB10, HSB20, HSE10, HSE20, HSE21, HSE41 2200P
HSB11, HSB21 2200P
HSB30 2400P
HSE31, HSB31, HSE32 2800P
HSE50 3300P

NATIONAL
NV8050, NV8051 2800P
AG1000, AG1050, NV260 1650P
AG6010, AG6015 2500P
AG6840 2400P
NV200 850P
NVD80 5000P
NVF65, NVH75 3400P
NVF51 4200P
NVG19 2300P
NVJ33, NVL21, NVJ30 1800P
NVJ35 3000P
NVM1, NVM3, NVM5 4200P
AG2100, AG2200 700P
NVF65 3200P

N.E.C.
DX2000 3400P
DS6000 3500P
DX1000, DX1600, N9040, N9053, N9055 2000P
DX4000, N9610, DX3000 3200P
N9052, N9530 3400P
N9110, N9120, N914C 2700p
VCP1 1700p
PVC2300, PVC240, PVC740, PVC744, PVC760, PVC764 1600P

SAMSUNG
VM1560, VN1561 2200P

SANYO
VHR7900 3600P

SHARP
VC585, VC685 2300P
VC90ET 3900P
VFH815 2800P

SONY
SLV373UB 3000P

TOSHIBA
V660 2350P
V880MS 2600P
V700G 3700P
V500G, V509G 2500P
V9680 2900P
V300G, V301, V305, V309G 2550P
V61, V63 1700P
V110, V120, V130, V140, V210, V220 1800P

TELEVISION ON/OFF MAINS SWITCHES

Baur, Normende, Nova, Pioneer, Quelle, Saba, Salora, TEC, Thomson & Vega 375P

VIDEO MOTORS

HITACHI
VT11, VT14, VT15, VT16, VT17, VT19, VT35, VT39, VT57, VT88 (capstan motor) 3100P

BANG & OLUFSEN
VHS65, VHS90 (capstan motor) 3100P

LOADING MOTOR UNITS

ITT
VR3605, VR3905, VR3955, VR3985 1100P
VP2826, VR3906, V43926, VR3976 1250P
VP3946, VR3906, VR3948, VR3986, VR3995, VR6948 1500P

JVC
HRD110, HRD111, HRD120, HRD121, HRD225 1100P
HRD140, HRD150, HRD157M, HRD158MS, HRD160, HRD250, HRD257MS, HRD566, HRP50 1250P
HRD455, HRD725, N895 1500P

SABA
VR6005, VR6014, VR7004, VR7011, VR8011, VR8014 1100P
VR6006, VR6007, VR608, VR6009, VR6018, VR7007, VR7018, VR9006 1250P
VR6016, VR6038, VR7016 1500P

TELEFUNKEN
VR1925, VR1930, VR1940, VR1950, VR925, VR930, VR940, VR950 1100P
A920, VR2920, VR12970, VR7921, VR7926, VR7931, VR7971, VR975 1250P
VR1970, VR1980, VR7970, VR7980, VR970, VR980 1500P

THOMSON
V320, V321, V323, V326, V4200, V4300 1100P
V342, V343, V352, V353, V360, V4210, V4230, V4260 1250P
V364, V368, V4400, V6000 1500P

THORN-FERGUSON
3V35, 3V36, 3V38, 3V39, 3V49, 8943, 8944 1100P
3V44, 3V45, 3V48, 3V54, 3V55, 3V57, 8947, 8947B, 8948 1250p
3V43, 9845 1500P

TOSHIBA
V55, V57 1100P
V65, V66, V67 1250P
V61, V63 1500P

CASSETTE HOUSING

AKAI
VS35, VS53, VS55, VS66, VS75 2600P

FERGUSON
FV31R 4300P

JVC & FERGUSON
HRD515, HRD520, HRD527, HRD540, HRD550, HRD580, HRD600, HRD610, HRD620, HRD660, HRD670, HRD830, HRD840, HRD850, HRD860, HRD4050, HRD6600 & FV37H 2400P

IC TRANSISTORS

M491BB1 500P
SAA5243PE 800P
TIP112H 50P
UPC1488H 150P
STR4090A 650P

IC AND TRANSISTORS

BU506DF 120P
BUZ11 200P
BUZ80 200P
M494B1 700P
SAA5231 300P
SAA1293 550P
S2000A3 175P
S2000AF 175P
S2055A 175P
S2000AF 200P
S2530A 100P
TEA201BA 200P
UC3844 100P
UPC1185H2 400P

REMOTE CONTROLS

AKAI
RC-V10A 1000P
RCV37B 1000P
V25A 1000P

BUSH
2020T, 2114T, 2321T, 2514T 1000P
2020, 2114, 2321, 2514 1000P

DECCA
RC70 850P

FISHER
RC905B 1000P

GRANADA/REDIFFUSION
UNIVERSAL, 79500C, 986700 850P
SATELLITE 1000P
MK4 TEXT, 70115G, 70133G, 70357E 850P
MK4A TEXT, 70375C 850P
95288E 1000P
94490D 1000P

VIDEO SERVICE KITS

AMSTRAD
[illegible]700
Contents
BELT SET, PINCH ROLLER, REEL IDLER, VIDEO LAMP
Order Code: SK41 **£5.50**

FERGUSON & JVC
[illegible]48
HR0456 - HRD725
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER | BELT SET, PINCH ROLLER
CLUTCH MECHANISM, TENSION BAND | SUPPLY CLUTCH, TAKE UP CLUTCH
Order Code: SK37 **£17.50** | **Order Code: SK38** **£9.50**

3V58 59 64 65
HR010 180 210 230 300 320 370 400 430 530 700 750
HR5000
Contents
BELT SET, PINCH ROLLER, IDELR ARM, TENSION BAND
Order Code: SK44 **£8.50**

3V29 3V30
HR7200 7300 7350
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK05 **£6.00**

3V35 36 38 39 49
HRD110 111 120 225
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK04 **£5.50**

3V31 3V42
HR7200 7610 7650 7655
Contents | *Economy Kit Contents*
BELT SET, TAKE UP REEL TABLE, TYRE, PINCH ROLLER, REEL IDLER, TAKE UP CLUTCH, TAKE UP IDLER, TYRE, TENSION BAND, VIDEO LAMP | BELT SET, TAKE UP REEL TABLE, TYRE, PINCH ROLLER, REEL IDLER TYRE, TAKE UP IDLER, TYRE, TAKE UP CLUTCH
Order Code: SK33 **£12.00** | **Order Code: SK34** **£5.50**

3V35 36 38 39 49
HRD110 111 120 121 225
Contents | *Economy Kit Contents*
BELT SET, TAKE UP REEL TABLE, TYRE, SUPPLY REEL TABLE, TYRE, PINCH ROLLER, TAKE UP CLUTCH, TAKE UP IDLER REEL, IDLER TENSION BAND | BELT SET, TAKE UP REEL TABLE, TYRE, SUPPLY REEL TABLE, TYRE, PINCH ROLLER, TAKE UP CLUTCH, TAKE UP IDLER TYRE, REEL IDLER TYRE
Order Code: SK35 **£10.50** | **Order Code: SK36** **£6.50**

3V30 3V30
HR7200 7300 7350
Contents | *Economy Kit Contents*
BELT SET, TAKE UP REEL TABLE, TYRE, SUPPLY REEL TABLE, TYRE, PINCH ROLLER, REEL IDLER, TAKE UP CLUTCH, TAKE UP IDLER TYRE, TENSION BAND, VIDEO LAMP | BELT SET, TAKE UP REEL TABLE, TYRE, SUPPLY REEL TABLE, TYRE, PINCH ROLLER, REEL IDLER TYRE, TAKE UP IDLER, TYRE, TAKE UP CLUTCH
Order Code: SK31 **£11.50** | **Order Code: SK32** **£5.60**

3V44 45 48 53 54 55 57
HRD140 150 158 160
HRD525 565 566 755
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND | BELT SET, PINCH ROLLER
Order Code: SK39 **£15.00** | **Order Code: SK40** **£9.50**

FISHER
[illegible]905 906 907 908 910 911 916 918
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER GEAR IDLER UNIT, TENSION BAND | BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK57 **£13.00** | **Order Code: SK58** **£5.00**

FVHP615 618 620 622 710 711 715 716 720 721 722 725
730 830 840
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER GEAR IDLER UNIT, TENSION BAND | BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK68 **£12.50** | **Order Code: SK69** **£3.60**

HITACHI
VT11 VT33
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK08 **£6.00**

VT11 VT33
Contents | *Economy Kit Contents*
BELT SET, TAKE UP REEL TABLE, TYRE, SUPPLY REEL TABLE, TYRE, PINCH ROLLER, FF REW IDLER TYRE, TAKE UP REEL TABLE TYRE, IDLER, CLUTCH PLATE, TENSION BAND | BELT SET, PINCH ROLLER, FF REW IDLER TYRE, TAKE UP REEL TABLE TYRE, SUPPLY REEL TYRE
Order Code: SK45 **£15.00** | **Order Code: SK46** **£4.50**

VIDEO SERVICE KITS *(Cont.)*

HITACHI
VT[illegible]01 02 63 64 65 85 86 640
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, FF REW ARM, CLUTCH PLATE, TENSION BAND | BELT SET, PINCH ROLLER, FF REW IDLER
Order Code: SK49 **£14.00** | **Order Code: SK50** **£3.25**

VT400 405 410 413 415 418 420 425 426 428 430 431 435 436 450 498 500 510 525 526 530 535 536 540 545 546 548 570 575 576 580 585 88
Contents
TIMING BELT, PINCH ROLLER, FF REW ARM, CLUTCH BASE, TENSION BAND
Order Code: SK52 **£11.50**

VT100 110 111 113 115 118 120 125 128 130 135 138 145 150 175 200 205 250 255 258 260 VT430
Contents
BELT SET, PINCH ROLLER, FF REW ARM, CLUTCH PLATE, TENSION BAND
Order Code: SK51 **£15.00**

PANASONIC
NV1000 NV2010
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK03 **£6.25**

NV7000 NV7200 NV7800
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK02 **£5.50**

NV300 NV330 NV333 NV340 NV366
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRE
Order Code: SK01 **£5.50**

NV2000 NV2010
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, FF IDLER, PLAY IDLER, TENSION BAND, VIDEO LAMP | BELT SET, PINCH ROLLER, IDLER TYRE, PULLEY TYRE
Order Code: SK13 **£9.50** | **Order Code: SK14** **£4.50**

NV7000 NV7200 NV7800
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND | BELT SET, PINCH ROLLER, IDLER TYRE, CLUTCH TYRE
Order Code: SK11 **£10.00** | **Order Code: SK12** **£4.20**

NV300 NV330 NV333 NV340 NV366
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND | BELT SET, PINCH ROLLER, IDLER TYRE, PLAY IDLER TYRE
Order Code: SK15 **£8.00** | **Order Code: SK16** **£4.00**

NVG7 NVG9 NVG10 NVG11 NVG12 NVG14 NVG15 NVG16 NVG18 NVG30 NVG120 NVG130 NVG400 NVH65 (PX ACT AG1[illegible] PK)
Contents | *Economy Kit Contents*
LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER TENSION BAND | LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER TYRE
Order Code: SK27 **£9.50** | **Order Code: SK28** **£4.50**

NV332
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, PLAY IDLER, FF REW IDLER, TENSION BAND, FF REW TYRE | BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF REW IDLER TYRE
Order Code: SK29 **£13.00** | **Order Code: SK30** **£5.10**

NV230 250 260 280 430 450 460 470 630 810 890
AG1200PK AG1500PK
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER TENSION BAND | BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK23 **£7.00** | **Order Code: SK24** **£3.50**

NV590 NV688
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, PLAY IDLER, FF REW IDLER, TENSION BAND | BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF REW IDLER TYRE
Order Code: SK25 **£13.00** | **Order Code: SK26** **£6.50**

NV720 NV770
Contents | *Economy Kit Contents*
SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER UNIT, TENSION BAND | SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER TYRE
Order Code: SK19 **£7.00** | **Order Code: SK20** **£4.30**

NV340 NV380 480 630 780 830 850 AG2100PK AG2900PK
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER TENSION BAND | BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK21 **£7.00** | **Order Code: SK22** **£3.50**

NV777 NV788
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, IDLER UNIT, TENSION BAND | BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK17 **£7.50** | **Order Code: SK18** **£4.00**

VIDEO SERVICE KITS *(Cont.)*

SHARP
VC381
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND, VIDEO LAMP | BELT SET, PINCH ROLLER, REEL IDLER TYRE
Order Code: SK47 **£9.00** | **Order Code: SK48** **£5.00**

VC500/VC571/VC581/VC582/VC583/VC584/VC5F3
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND | BELT SET, PINCH ROLLER, REEL IDLER
Order Code: SK60 **£9.50** | **Order Code: SK61** **£6.50**

VC761 VC7619 VC782 VC786 VC7[illegible] VC793 VC800 VCA100/VCA102/VCA104/VCA20[illegible]
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND | BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE
Order Code: SK64 **£13.50** | **Order Code: SK65** **£6.25**

VC681 VC6821 VC684 VC685 VC693 VC[illegible]
Contents | *Economy Kit Contents*
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND | BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE
Order Code: SK62 **£13.50** | **Order Code: SK63** **£6.25**

THIS MONTHS SPECIAL OFFERS

STK461	£6.00	STK7563F	£8.00
STK5332	£1.80	STK73410	£3.50
STK5333	£5.50	TA8205AH	£2.50
STK5422	£3.75	TA8210AH	£3.80
STK5476	£3.50	TA8215H	£3.00
STK7308	£3.50	TA8216H	£3.75
STK7348	£4.00	TIPL791A	£0.40
STK7358	£4.40		

SONY FUNCTION SWITCH (2 LEG) SPECIAL PRICE £0.50

VIDEO REEL MOTOR PU51381V £15.00
3v29, 3v30, 3v31, 3v32, 3v38, 8930, 8931, 8941, 8942, HR7200, HR7300, HR7600, HR7610, HR7650, HR7655

HITACHI VIDEO HEAD £11.00
VT11, VT14, 16, 30, 33, 34, 330, 340, 503, 640, 5030

MITSUBISHI VIDEO HEAD £15.00
HS303, 304, 320, 700

HS306, 318, 710 £18.00

HS300, 301, 302, 310 £17.00

HS337, 347 £17.00

HITACHI TRANSFORMER 2434274 £14.00

OUTPUT TV MODULE HM6251 £5.50

PHILIPS
CASSETTE LIFT ASSEMBLY 69120366 £11.00
DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, VR6285, 6290, 6291, 6293, 6362, 6367, 6393, VR6467, 646, 6470, 6561, 6670, 6760, 6761, 6870, 6970

PRESSURE ROLLER ASSEMBLY £4.00
DV186, DV190, DV286, DV486, DV471, DV582, DV761, VR6180, VR6182, VR6185, VR6285, VR6290, VR6291, VR6293, VR6362, VR6367, VR6390, VR6391, VR6393, VR6467, VR6468, VR6470, VR6561, VR6570, VR6581, VR6670, VR6676, VR6760, VR6761, VR6762, VR6870, VR6970, VR6975, VR8681, 63SB7, 68SB4, 71SB4, 72SB8, 92SB31

I.C. PROTECTOR

ICPF10	ICPN5
ICPF15	ICPN10
ICPF20	ICPN15
ICPF25	ICPN20
ICPF38	ICPN25
ICPF50	ICPN38
ICPF75	ICPN50
	ICPN75

PRICE: ONLY 30p EACH

IMPORTANT NOTICE
Attention all customers who purchased the WOODEN HANDLE SOLDERING IRONS, BRAND MITSUKO – MODEL MX-34 (30, 40 AND 60 WATTS) from us.
Please DO NOT USE this tool. We would like you to return this item to us immediately and we will refund your money together with the postage.
We apologise for any inconvenience caused

GRANDATA LTD

K.P. HOUSE, UNIT 15
POP IN COMMERCIAL CENTRE, SOUTHWAY
WEMBLEY, MIDDLESEX, ENGLAND HA9 0HB
Telephone: 081-900 2329 Fax: 081-903 6126

Access & Visa Card accepted. Open Monday to Saturday.

ELC EAST LONDON COMPONENTS
AUDIO TELEVISION VIDEO
COMPONENTS AT VERY KEEN PRICES
TEL: 081-472 4871 FAX: 081-503 5926

REMOTE CONTROLS FROM £9.99
IDLER TYRES 50p
VIDEO HEADS FROM £6.99
Over 200 models at very attractive prices.
AKAI, AMSTRAD, FERGUSON, FISHER, GOLDSTAR, HINARI, HITACHI, LOGIC, MATSUI, ORION, PANASONIC, SAISHO, SHARP AND MANY MORE

VIDEO SPARES

3V29 TAKE UP IDLER	£1.00p
3V29 F/F REW IDLER	£2.60p
3V59/65 FV10/14 IDLER	£1.50p
3V23 LOADING ROLLER BAR	£3.99p
SHARP 0005 & 0006	£1.95p
SHARP VC651 ASSEMBLY	£6.99p
VT11/14/17 IDLER	£1.95p
VT11 CLUTCH ASSEMBLY	£6.99p
VT100/225/260 IDLER	£2.75p
NEC 9013 IDLER	£4.99p
SANYO VHR3300 IDLER	£3.99p
AKAI VS105/250 CLUTCH ASSEMBLY	£11.99p
SAISHO VR380 CLUTCH	£4.99p
MITSUBISHI H5337 F/F IDLER	£2.70p
ALBA SENTRA PULLEY	£1.35p
MATSUI LIMITER POST	£1.25p
PANASONIC NV370 IDLER	£1.95p
FISHER 615 IDLER	£3.50p
FISHER GEAR ASSEMBLY	£4.50p
AMSTRAD PINCH WHEEL MOD KIT	£5.99p
UNIVERSAL TRIPLER	£4.99p
UNIVERSAL TRIPER WITH FOCUS	£7.99p
HITACHI MODULE HM6251	£6.99p
CUC2410 TRIPLER	£16.99
TENSION BAND FOR MOST MOD. FROM	£1.99p
CIRCUIT PROTECTOR ICP	50p
TX10 FOCUS UNIT	£7.99p
PHILIPS BACK-UP BATTERY	£1.50p
ALBA BATTERY .1F 5.5V	£2.50p
TV SWITCHES FOR MOST MOD. FROM	£1.00p
SONY FUNCTION SWITCH	£1.00p

VIDEO BELT KITS

AKAI	
VS1/2/5	1.75
VS22/35	2.00
VS105/250	1.50
ALBA	
VCR4000	1.50
AMSTRAD	
VCR4600	1.80
VCR6000	1.30
VCR7000	1.00
FERGUSON	
3V22	1.80
3V29/30/33	1.00
3V42/65	0.85
HRD520/830	1.20
FISHERS	
FYHP615/725	1.10
FYHP905/910	1.10
GRUNDIG	
VS180	1.45
VS300	1.90
VS380	1.75
HINARI	
VXL3-20	1.25
VXL4-35	1.50
HITACHI	
VT11/33	1.30
VT52/65	1.75
VT110/220	1.80
MITSUBISHI	
HS306/307	1.75
PHILIPS	
YR6548	2.40
YR6367	1.50
SAMSUNG	
VX510/520	1.50
SANYO	
VHR1300	2.15
VHR3300	2.05
SHARP	
VC381	1.30
VC651/681	1.25
VC9300	1.50

ELC EAST LONDON COMPONENTS
63 PLASHET GROVE, EAST HAM,
LONDON E6 1AD. TEL: 081-472 4871
two minutes walk from Upton Park Tube Station
PLEASE PHONE US IF WHAT YOU NEED
IS NOT LISTED AS WE HOLD THOUSANDS
OF ITEMS IN STOCK
ADD £1 P/P ADD 17.5% VAT
ALL GOODS DESPATCHED SAME DAY
PRICE SUBJECT TO CHANGE WITHOUT NOTICE
VISA ACCESS ACCEPTED. MIN ORDER £5.00

LINE OUTPUT TRANSFORMERS

DECCA	
100	9.99
FERGUSON	
TX85	19.99
TX90	
REDSPOT	19.99
WHITE SPOT	14.95
TX98	29.95
TX100	
GREEN	
SPOT	14.95
BLUE SPOT	19.99
YELLOW	
SPOT	21.99
FST	21.99
ICC 5	19.99
FISHER	
FTH551/651	19.99
FIDELITY	
14" TO 20"	12.99
22"	19.99
HINARI	
CT4/5	16.99
HITACHI	
CPT1444	21.99
CPT1453	19.99
CPT1456	19.99
CPT1471	29.99
CPT1473	29.99
CPT1474	19.99
CPT1476	19.99
CPT1492	19.99
CPT1493	19.99
CPT2028	21.99
CPT2078	19.99
CPT2174	19.99
CPT2176	19.99
CPT2178	19.99
CPT2234	19.99
CPT2248	19.99
CPT2274	19.99
CPT2278	19.99
CPT2508	39.99
CPT2808	39.99
CPT2478	25.00
ITT	
CVC20	13.99
CVC26/32	9.99
COMPACT	
BOR	19.99
FST	19.99
CVC1215	19.99
DIGI3 110	19.99
DIGI3 90	19.99
CT3315	19.99
CT3835	19.99
FX3448	19.99
FX3548	19.99
SFX3489	19.99
SFX3888	19.99
ST35767	19.99
TX3325	19.99
TX3437	19.99
TX35467	19.99
TX3635	19.99
MATSUI	
1420	17.99
1480	17.99
MITSUBISHI	
CT2529	21.99
LOEWE OPTA	
CLASSICS	
127	21.99
STUDIO T28	21.99
M124	30.00
PHILIPS	
KT3	13.99
K30/35	21.99
K40	19.99
2A	19.99
3A	19.99
CP90	19.99
CTXE	19.99
CTXS	19.99
SAISHO	
CT141	17.99
CT142RX	17.99
CT149TX	17.99
SANYO	
CTP7130	39.99
CTP7133	39.99
CTP7135	39.99
CBP2146	30.00
SABA	
S1583	19.99
SCHNEIDER	
STV1500	16.99
SENTRA	
GX9000	16.99
SOLAVOX	
14R19	19.99
16R19	19.99
20T119	19.99
SONY	
KV1612	19.99
KV16XHTU	19.99
KV2052	19.99
KV2066	19.99
KV2212	19.99
KV2217	19.99
KV2252	19.99
KV2704	19.99
KV2705	19.99
KV2752	19.99
PANASONIC	
TLF14520F	29.99
TLF14521F	29.99

3V65/FV32 CASSETTE HOUSING	25.00
3V35/45 CASSETTE HOUSING	21.99
VT33/65 CASSETTE HOUSING	24.99
OSAKI VCR33 HOUSING	24.99
VT400/800 HOLDER CASSETTE	7.00
VT400/800 SIDE BRACKET	11.99
VR6462 CASSETTE HOUSING	19.99
VR6367 CASSETTE HOUSING	14.99
3V35 CAPSTON MOTOR	19.99
3V65 CAPSTON MOTOR	24.99
VT11/33/65 CAPSTON MOTOR	24.99
VT110/150 CAPSTON MOTOR	24.99
VT500 CAPSTON MOTOR	29.99
VT600/700 CAPSTON MOTOR	29.99
MVG SERIES PINCH ASSEMBLY	8.50
MITSUBISHI ASSEMBLY	19.99
VR6367 PINCHWHEEL RACK	5.99
VR6367 MODIFICATION KIT	8.99
VR6367 CHARLIE LOADING GEAR	6.90
VIDEO HEAD PULLER	9.99
VCR CICLIPS & SPRING KIT	5.50

AN3822K	7.99	LA7835	1.99	STK5720	6.00	TDA1516	4.00	UPC1378	2.20	2SB705	2.00
AN5151	6.99	MEA2901	2.60	STK5730	6.00	TDA1518	4.00	UPC1394	1.90	2SB755	3.50
AN5435	2.50	M490B81	8.50	STK6962	5.80	TDA1520	4.00	UPC1420	5.25	2SB817	2.00
AN5515	2.99	M491B81	8.50	STK7216	7.00	TDA1521	3.50	UPC1470	2.00	2SB861	0.60
AN5521	2.99	M49481	8.50	STK7226	8.50	TDA1522	3.99	UPC1488	3.50	2SB882	0.80
AN5900	1.50	M5840A 84	9.99	STK7308	4.25	TDA1670	3.00	UPC1498	3.50	2SB891	1.40
AN7161	3.40	M54543L	2.99	STK7348	4.50	TDA1701	4.25	X2402P	4.25	2SB892	0.80
AN7171	4.25	M54544L	2.99	STK7356	9.00	TDA1770	4.00	SG264A THY	7.00	2SB1010	0.75
AN7178	2.60	M54545L	2.99	STK8250	8.00	TDA1908	1.00	SG613 THY	11.00	2SB1016	0.80
BA718	1.95	M54548L	4.25	STK73410	6.99	TDA2003	1.00	TRANSISTORS		2SC828	0.25
BA3402	3.99	M54549L	4.50	STR441	6.50	TDA2005	1.30	BC372	0.50	2SC829	0.25
BA5402	2.50	M54644L	3.99	STR3125	5.99	TDA2030	1.30	BC368	0.30	2SC867	3.75
BA6109	1.80	M54647L	3.99	STR4211	5.99	TDA2170	3.00	BF869	0.60	2SC1061	0.90
BA6121	2.99	M54648L	3.99	STR5412	4.50	TDA2270	3.25	BU208A	0.85	2SC1173	0.50
BA6122	1.99	M54649L	3.99	STR6020	4.50	TDA2575	2.00	BU500	0.99	2SC1212	0.60
BA6209	2.50	MB3730	2.00	STR9012	6.00	TDA2577	2.00	BU508A	0.99	2SC1399	0.60
BA6219	2.99	MB3731	2.99	STR41090	6.00	TDA2578	3.00	BU508AF	1.30	2SC1413A	2.40
BA6222	1.99	MB3732	2.99	STR40115	7.75	TDA2579	2.50	BU508DF	1.50	2SC1454	3.25
BA6229	2.80	MC1306T3	3.99	STR40090	5.99	TDA2581	3.00	BU508DR	1.60	2SC1573	0.40
BA6238	1.99	MDA2061	5.99	STR50020	6.50	TDA2582	3.00	BU903	1.60	2SC1670	0.85
BA6239	2.50	MDA2062	4.25	STR50103	4.99	TDA2600	5.75	BU908	1.99	2SC1678	1.20
BA6304	1.90	STK430	7.00	STR50115	6.50	TDA2653A	3.50	BUT11A	0.85	2SC1827	1.20
BA6305	1.90	STK433	4.99	STR54041	5.50	TDA3330	7.00	BUT11AF	1.20	2SC1922	2.75
BA6259	2.99	STK457	6.50	STR55051	8.50	TDA3505	4.00	BUT56A	1.20	2SC1941	0.65
BA10324	1.99	STK459	5.99	STR58041	5.50	TDA3560	3.25	BUK444	2.99	2SC1942	1.95
BA10358	1.80	STK461	7.50	STR59041	6.50	TDA3561	3.00	BUX85	0.65	2SC1969	1.60
BA15218	2.20	STK463	10.00	STR10006	6.00	TDA3562	3.00	BUW11A	1.40	2SC2078	0.80
CNY65	4.99	STK465	7.50	STR01806	6.00	TDA3565	3.00	DTA114	0.70	2SC2229	0.30
CNY75	2.99	STK5029	3.99	SAA1025	6.00	TDA3576	7.00	DTA124	0.45	2SC2235	0.40
CNX62A	2.99	STK0040	5.50	SAA1250	3.50	TDA3640	4.00	DTA144	0.50	2SC2335	1.20
CNX82	3.99	STK0060	9.99	SAA1251	4.50	TDA3650	10.00	DTC114	0.60	2SC2458	0.30
CNX83	2.99	STK2029	5.99	SAA1290	8.00	TDA3651	2.00	DTC124	0.50	2SC2502	0.90
HA1377	1.99	STK2048	11.00	SAA1291	9.00	TDA3653	2.99	DTC144	0.55	2SC2564	2.40
HA1397	2.60	STK2129	7.00	SAA1293-03	8.50	TDA3654	1.99	MJ2955	0.75	2SC2565	2.75
HA11225	1.99	STK2250	8.00	SAA1294-03	13.00	TDA3300	5.00	MJE340	0.40	2SC2577	1.20
HA11227	2.20	STK3041	6.00	SAA5000	2.50	TDA4500	3.75	MJE13005	1.30	2SC2579	1.30
HA11235	1.99	STK3042II	6.50	SAA5010	4.30	TDA4501	4.75	MN650	4.00	2SC2580	1.80
HA11423	2.20	STK3062II	7.00	SAA5012	3.75	TDA4502	5.00	R4050	1.30	2SC2581	2.00
HA11711	6.50	STK4026	9.00	SAA5020	3.50	TDA4503	3.50	R4051	1.50	2SC2751	2.60
HA11717	4.75	STK4121II	7.00	SAA5030	4.99	TDA4505 3Y	4.00	S2000AF	1.50	2SC3156	2.60
HA11753	5.99	STK4122	8.00	TA7193	4.00	TDA4504	4.99	S2055AF	1.50	2SC3182	2.50
HA11758	5.00	STK4131II	6.50	TA7205	1.00	TDA4505 E	5.99	TIPL761A	1.75	2SC3281	3.00
HA13001	1.95	STK4132II	7.00	TA7222	1.20	TDA4505 M	12.99	TIPL791A	1.30	2SC3284	1.60
HA13008	9.99	STK4141II	6.50	TA7240	2.60	TDA4600	1.99	TIP112	0.70	2SC3519	1.50
HA13108	3.50	STK4141V	8.00	TA7241	2.60	TDA4601	1.99	TIP3055	0.60	2SC3679	2.00
HA13117	2.99	STK4142II	7.75	TA7264	4.99	TDA4950	1.99	2N3055	0.75	2SD315	0.80
HA13118	2.99	STK4151II	7.00	TA7269	5.50	TDA6200	8.00	2N3773	1.30	2SD400	0.20
HA13119	2.99	STK4152II	9.00	TA7270	2.50	TDA7240	3.00	2SA769	1.30	2SD401	0.50
HA13402	3.25	STK4161II	9.99	TA7271	2.50	TDA8170	2.99	2SA773	0.75	2SD424	3.50
HA13403V	5.50	STK4162II	8.00	TA7273	3.50	TDA8175	2.99	2SA965	0.25	2SD427	3.50
LA4182	1.99	STK4171II	9.99	TA7279	4.00	TDA8178	4.25	2SA985	0.65	2SD716	1.20
LA4270	2.99	STK4172II	9.00	TA7280	2.99	TDA8185	5.00	2SA999	0.20	2SD718	1.30
LA4282	3.80	STK4181II	9.00	TA7281	2.75	TDA8190	3.00	2SA1013	0.30	2SD725	3.50
LA4440	2.20	STK4182	9.99	TA7283	2.60	TPU2732	19.99	2SA1020	0.30	2SD837	0.80
LA4445	2.60	STK4191II	9.99	TA7288	2.20	TMS47C432	15.00	2SA1094	1.90	2SD845	2.50
LA4460	1.60	STK4192	9.99	TA7293	4.50	UPA81C	1.99	2SA1095	2.75	2SD856	0.80
LA4461	1.60	STK4372	6.00	TA7299	3.99	UC3844	2.99	2SA1102	1.80	2SD869	3.25
LA4465	2.99	STK4392	7.50	TA7680	4.00	U4646	8.50	2SA1104	2.00	2SD870	3.25
LA4466	2.99	STK4853	9.99	TA7699	8.50	UPC1031	1.80	2SA1106	2.00	2SD871	3.25
LA4475	2.99	STK5211	9.99	TA8200	4.99	UPC1181	1.10	2SA1141	2.00	2SD1047	2.00
LA4476	2.99	STK5315	6.50	TA8201	3.50	UPC1182	1.10	2SA1146	1.90	2SD1065	2.00
LA4495	3.95	STK5325	7.00	TA8207	3.25	UPC1185	6.00	2SA1208	1.50	2SD1138	0.60
LA4496	3.99	STK5332	3.50	TA8210	3.50	UPC1188	4.00	2SA1232	1.80	2SD1207	0.50
LA4500	2.30	STK5333	5.99	TA8214	3.50	UPC1230	2.10	2SA1265	1.50	2SD1276	1.20
LA4505	2.60	STK5338	3.99	TA8215	3.99	UPC1238	1.80	2SA1302	3.00	2SD1292	0.50
LA4508	2.60	STK5342	5.99	TA8216	4.25	UPC1225	2.20	2SA1386	2.75	2SD1397	2.00
LA4700	3.99	STK5372H	5.50	TA8220	6.75	UPC1241	3.50	2SB536	0.60	2SD1398	1.70
LA6324	2.50	STK5421	7.00	TA8221	6.75	UPC1277	2.40	2SB554	3.50	2SD1426	2.75
LA7330	4.99	STK5422	6.50	TA8400	3.99	UPC1278	2.40	2SB557	3.00	2SD1427	2.75
LA7520	4.99	STK5434	7.00	TEA1039	1.99	UPC1288	4.00	2SB558	3.00	2SD1432	2.75
LA7522	6.50	STK5436	8.00	TEA2018A	1.40	UPC1298	4.00	2SB560	0.40	2SD1439	2.00
LA7530	3.99	STK5451	7.00	TEA2029	3.00	UPC1310	8.00	2SB562	0.40	2SD1453	1.70
LA7800	1.80	STK5466	8.50	TEA2164	3.00	UPC1335	4.00	2SB595	0.80	2SD1497-02	6.00
LA7801	1.95	STK5471	4.99	TDA1037	2.00	UPC1318	4.00	2SB632	0.40	2SD1497-06	6.00
LA7802	1.95	STK5476	6.99	TDA1044	2.50	UPC1363	3.00	2SB643	0.20	2SD1548	5.50
LA7820	3.50	STK5481	4.99	TDA1170	1.20	UPC1364	5.00	2SB649	0.65	2SD1555	4.00
LA7830	1.99	STK5482	4.99	TDA1510	3.50	UPC1365	3.25	2SB686	1.20	2SD1877	2.50
LA7832	1.99	STK5490	5.50	TDA 1515	2.50	UPC1377	2.50	2SB688	1.30	2SD1911	4.00

REMOTE TESTER £14.99 LOPT TESTER £29.99 VIDEO HEAD TESTER £29.99 DEGUSSING ROD 29.99
SATELLITE FINDER KIT £29.99 MICROWAVE LEAK DETECTOR £14.99 DIGITAL MULTIMETER FROM £9.99

P.V. TUBES
104 ABBEY STREET, ACCRINGTON
LANCS BB5 1EE
☎ 0254 236521/232611
FAX 0254 395364
24 Hr Answering Service

WE ARE CLOSED ALL DAY WEDNESDAY
CALLERS WELCOME AT TRADE COUNTER
MON-FRI 9-5pm SAT 9-3.30pm

SEND LARGE S.A.E. FOR TRADE CATALOGUE

BRAND NEW TV's and VIDEOS

We have a full range of TVs and Videos – Multisystems and PAL sets available in stock now. 25" and 29" Stereo Nicam sets including stand plus full warranty

BEAT THE BURGLARS

NOW A REMOTE CONTROL HOME SECURITY

SYSTEM WITH CORDLESS DETECTORS

COMPLETE STARTER KIT £183.00 + VAT
- Easy to install
- Advanced Radio & Microchip Technology
- Transmitting on FM wavelength
- Fully protected against radio signal jamming
- Expandable to most requirements including smoke detection
- Intelligent keypad control panel
- Full step by step instructions
- Installation Helpline
- Conforms to DIY Intruder Alarm Standards BS6707 and Wireless Standard BS6799 (Class IV/Part A)

NEW COMPLETE D.I.Y. BURGLAR ALARM SYSTEM – ALL YOU NEED. INCLUDES DIGITAL 4 ZONE PANEL (2 DETECTORS AND THE REST!) ONLY £99+VAT

"If you think your set is PAST IT, don't put it in the bin. Ring and ask for SHE or CHRIS, they're sure to have it in!"

VALVES
NEW – Branded Boxes – full range – (matched pairs available)

ECC81	£2.90	ECC82	£2.90
ECC83	£4.90	ECC85	£3.00
ECC88	£3.24	ECL82	£3.37
ECL86	£3.50	EL34	£7.00
EL84	£3.00	EL519	£6.59
GZ34	£5.00	KT66	£9.75
KT88	£18.00	PCL805	£2.70
PCL86	£3.00	PC504	£3.00
PLS19	£5.90	PY500A	£2.95
128Y7A	£5.50	6L6GC	£5.31
6L6GT	£5.31	6KD6	£12.95

SATELLITE EQUIPMENT

Powerhid remote xtender	£51.00
Pace 900 receiver only	£158.00
Pace 900 & 60cm dish/LNB	£220.00

Full range of cable, connectors etc.

WE CAN'T LIST EVERYTHING THAT WE STOCK. OUR RANGE IS EXTENSIVE. WE HAVE A TRADE CATALOGUE ON REQUEST. WE ARE ALSO ON LINE WITH "MOVIES" TO ORDER ANY PHILIPS PART QUICKLY. JUST SOME OF THE THINGS WE SELL:-AERIALS, BRACKETS, BATTERIES, CABLE CONNECTORS, CMOS CAPACITORS, COMPUTER ACCESSORIES, DISCS, DIODES, ELECTRICAL ACCESS, FUSES ICs, LOPTX, LEADS, MANUALS, PUSH BUTTON LIGHTS, PHONES, PHONE ACCESS, POTENTIOMETERS, RELAYS, SEMICONDUCTORS, STRIPBOARD, STYLI, SMOKE DETECTORS, SWITCHES, TUNERS, TV BATTERY LEADS, TV WALL BRACKETS, TOOLS, TEST EQUIPMENT, VALVES AND EVERYTHING YOU NEED FOR VIDEO REPAIRS - HEADS, IDLERS, TYRES, PINCH ROLLERS, CLEANERS, TEST CASSETTES, VIDEO TAPE (Inc BETA and V2000) etc.

P.V. TUBES

– THE COMPANY WHERE NO QUERY IS TOO SMALL

EX-RENTAL TVs/VIDEOS ALWAYS AVAILABLE FROM TRADE COUNTER

NEW 5" TV/Monitor Colour £135

THE RECEIVERS ARE IN AT
P.V. TUBES
(AKAI THAT IS!!!) AKAI SRX1000 SAT RECEIVER 200 CHANNEL – PRE TUNED FOR ASTRA ID-RTLS – RING FOR SPECIAL PRICES

One for all 4 remote control	£19.95
Degaussing Coil	£27.50

Custom made leads – we can make up leads to your own requirements – just ask

HOW TO ORDER: Up to 1K ADD £2.00 per order P+P (U.K.). Heavier parcels, e.g. cables, service aids, degausing coils please allow £4.00 P+P (U.K.). Export orders charged at cost. First Class Mail is used whenever possible. Add 17.5% VAT to total except where it states zero rate. Over 3K will be sent by carrier £12.00 + VAT up to 15K (except tubes). We do not despatch on Saturdays.

VISIT OUR STOCK CLEARANCE ROOM

Goods are despatched on the day we receive your order. If for any reason we are out of stock we will try to inform you as quickly as possible. We try our best to give a speedy, fair and efficient service. VAT invoice on request. Give us a ring – we'll give you service. Please ask if what you need is not listed – we will try to help. Prices are subject to change without notice. In some cases we may have to supply an equivalent. We need expiry dates for credit card orders. MIN. ORDER £5.

BARGAINS GALORE

EST. 1977
J.W. HARDY
YOUR ONE-STOP-SHOP
FOR THESE FINE BRANDED PRODUCTS – AND SO MUCH MORE . . .

Wolsey SMATV
DIAMOND AERIALS UHF/FM
GLOBAL COMMUNICATIONS FIRST IF, SMATV
J.W. HARDY communications UHF AERIALS UHF AMPLIFIERS
Labgear Cablevision SMATV
LH LENSON HEATH SATELLITE ANTENNA
PACE SATELLITE RECEIVERS, DECODERS
PALCOM SATELLITE RECEIVERS
PROMAX TEST EQUIPMENT
Spit Fixings BOLTS PLUGS
mungo BOLTS PLUGS
Teleste SMATV
TRIAX U.K. UHF/VHF AERIALS
TOWER CLIPS
UNIFIX CLIPS
VOLEX RAYDEX COAX CABLES

- WE PROVIDE FULL TECHNICAL ASSISTANCE AND SERVICE BACK UP ON ALL OUR PRODUCTS
- SMATV – DISH SHARING – DESIGN CONSULTANT

Trade Price List available to bona fide TV Aerial and Satellite Dealers on proof of trading.

J.W. Hardy, 231 Station Road, Stechford, Birmingham B33 8BB. Telephone: 021-784 8478

WE WILL ONLY SUPPLY TOP QUALITY, BRANDED COMPONENTS. REPUTATION COUNTS WITH US

G.G.L. COMPONENTS

PO BOX 72, UNIT 7, SOUTH JOHN STREET, CARLISLE, CUMBRIA CA2 5AL.
TEL: (0228) 39693/20358 Fax: (0228) 515127.

BUY WITH

Access VISA

AERIAL ACCESSORIES
COAX PLUG....18
F CONNECTOR....20
FLY LEAD 2M....75
VIDEO LEAD 2M....75
4 WAY DISTRIBUTION AMPLIFIER MAINS....19.95
8 WAY DISTRIBUTION AMPLIFIER MAINS....21.75

BATTERIES
AA (pkt of 4)....1.20
AAA(pkt of 4)....1.20
FERGUSON 3V55....4.95
PHILIPS MEMORY 1V2....1.90
PHILIPS MEMORY 2V4....2.75

CAPACITORS
0.1f 5.5v (back-up)....2.50
63v
47uf at 63v....18
100uf at 63v....22
220uf at 63v....35
250v
1uf at 250v....20
4.7uf at 250v....25
10uf at 250v....35
22uf at 250v....40
47uf at 250v....65
100uf at 250v....1.25
400v
1uf at 400v....23
4.7uf at 400v....35
10uf at 400v....70
22uf at 400v (ALL PCB MOUNTING)....85

DIODES
R2M....95
BY133....15
BY227....20
BY299/800....35
IN4007....10
IN5408....20
BZX61C (pkt of 5)6v8 7v5 12v 15v 24v 33v 68v 120v 130v 1.00

EHT TRAYS
CONTINENTAL 30AX FOCUS 8.95
DECCA 120/130....7.95
GRUNDIG CUC2410 14"....15.75
GRUNDIG CUC2410 22"....15.75
PHILIPS KT3....7.95
UNIVERSAL....5.95

FUSES
20mm A/S (PKTS OF 10)
250MA, 315MA, 500MA, 630MA ..1.20
800MA,1A,1.6A,2A,2.5A,3.15A
20mm Q/B (PKTS OF 10)
500MA, 630MA, 800MA, 1A, 1.6A,2A,2.5A,3.15A....80

I.C's
CNX62A....4.75
SAA1293-02....5.95
SAA1293-03....7.95
SAA1293A-03....8.35
SL1432....1.95
STK5331....4.95
STK5332....4.95
STK5333....7.35
STK5421....4.95
STK5422....6.95
STK5481....6.95
STK5482....4.95
STK5490....7.95
STK7308....5.50
STK7348....5.50
STR4211....4.50
STR5412....4.95
STR50020....7.35
STR50103A....5.95
STR54041....6.95
STR58041....5.95
TDA1170S....1.95
TDA1770A....3.95
TDA2030....1.95
TDA2170....2.95
TDA2270....2.75
TDA2576A....5.95
TDA2577A....3.50
TDA2578A....2.95
TDA2579....3.95
TDA2581....4.50
TDA2582....2.50
TDA2600....5.50
TDA2653AQ....2.95
TDA3330....8.50
TDA3560....4.95
TDA3561A....4.95
TDA3562A (TFK)....4.95
TDA3565....3.95
TDA3571BQ....8.95
TDA3576B....12.95
TDA3650....8.95
TDA3651/3....2.95
TDA3651AQ....4.75
TDA3653A....3.50
TDA3654A....2.95
TDA4500....4.50
TDA4501....5.25
TDA4503....4.95
TDA4505E....5.45
TDA4600/3....2.95
TDA4600/2D....3.95
TDA4601....2.95
TDA4601 DIL....3.75
TEA1039....1.95
TEA2018A....2.50
TMP47C434N-3414....14.95
TMP47C434N-3415....14.95
TMP47C434N-3537....14.95
TMP47C434N-3555....15.55
TMP47C434N-3558....15.55
TMP47C434N-3559....14.95
CIRCUIT PROTECTORS
N10,N20,N25 (each)....50

LINE O/P TRANSFORMERS
FERGUSON TX90 20"....15.95
FERGUSON TX99 51P7....23.50
FERGUSON TX100 90D....18.25
FERGUSON TX100 110D....14.50
FERGUSON TX100 FST....17.75
FIDELITY ZX2000 + MOD....13.95
FIDELITY ZX3000....12.95
HINARI CT4/5....16.95
HITACHI CPT1474/1476....18.95
HITACHI CPT2174/76/78....17.95
HITACHI CPT2276/2278....17.50
HITACHI CPT2476/2478....18.95
ITT COMPACT 80....18.50
ITT CVC1200/1....19.95
ITT MONOPRINT B(MN)....18.85
MATSUI 1410/20/40....18.95
PHILIPS CF1....23.50
PHILIPS CP90....17.95
PHILIPS CTX14"/20"....20.35
PHILIPS 2A....18.50

SERVICE MANUALS
AMSTRAD 4600....9.95
AMSTRAD 6000....9.95
FERGUSON TX85....9.95
FERGUSON 3V59....13.95
FERGUSON 3V65....13.95
FERGUSON FV11....13.95

SWITCHES
FIDELITY CTV140....1.50
GRUNDIG CUC731....3.50
ITT TX SERIES....4.95
KT4/CTX REMOTE....1.75
TX9/10 STANDARD....1.00
TX9/10 REMOTE....1.75
TX90/100 STANDARD....1.50
TX90/100 REMOTE....1.75

TRANSISTORS
BC639....20
BC640....20
BF460....95
BU208D....1.95
BU426A....1.45
BU500....2.00
BU508A....1.50
BU508AF....1.95
BU508D....1.95
BU508DF....2.50
BU508V....2.25
BU807....1.75
BUT11AF....2.35
BUT56A....2.25
BUX84....80
R4050....2.95
T9053V/T9054V....3.50
T9064V....1.95
TIP29E (TO168V)....75
TIP41C....50
TIP42C....50
TIP112H (T0167V)....75
TIPL791A....1.95
2SD1497....3.95
2SD1497/02....4.25
TRANSISTOR EQUIVALENT BOOKS
TVT A-Z & 2N-2SD....28.45

NEW RANGE OF PANASONIC LOPTS ASK/RING FOR DETAILS

REMOTE CONTROLS
FERGUSON T725....9.75
FERGUSON T734....9.75
FERGUSON T742....9.75
FERGUSON T785 FAST TEXT11.95
FERGUSON T789 FAST TEXT11.95
FERGUSON TX10 NON TEXT11.50
FERGUSON TX10 TEXT....9.75
FERGUSON TX100 STEREO11.95
FERGUSON TX100 TEXT....10.95
FERGUSON ICC5....17.95
FERGUSON SRA1....13.50
FIDELITY CTV14S....12.95
FIDELITY CTV22T....12.75
FINLUX 1101 TO 2386....11.50
GOODMANS TX1100/1200....18.95
GRANADA UNIVERSAL....12.95
GRUNDIG TP400 TEXT....12.90
GRUNDIG TP650 TEXT....14.25
GRUNDIG TP660....11.45
HITACHI CPT1446....13.95
HITACHI CPT2174....17.95
HITACHI CPT2188....9.75
HITACHI CPT2246....14.50
ITT FS9/10 DIGIVISION....13.25
ITT RG305....13.25
ITT RG306....13.95
ITT VS4....13.25
ITT VS5 TEXT....13.25
MATSUI 1440....12.75
PACE 6000....13.95
PANASONIC TNQ1411/2....14.95
PANASONIC TNQ1419....13.95
PHILIPS G11 I/R TEXT....13.95
PHILIPS KT3/30 NON TEXT..12.95
PHILIPS KT3/30 TEXT....12.50
PHILIPS RC5991....12.95
PHILIPS RC5903 GENUINE..12.95
PHILIPS MINIATURE....9.95
PHILIPS VR6462....12.25
PHILIPS VR6467....12.95
PROGRAMMABLE....22.50
REDIFFUSION MKIV....10.95
REDIFFUSION MKIVA....12.45
SAISHO CT142R....11.50
SAISHO CT149TX....12.95
SANYO VHR 1100/1200....14.25
SONY RM615/632/636....10.75
SONY RM670/672/676....10.75
TATUNG RC40/45....10.25
TATUNG RC70....10.25
TATUNG RC90....11.95
TOP TEL*******....24.95

VIDEO HEADS
AKAI VS1/5....8.50
ALBA 4000X....16.95
AMSTRAD 4500/9000....14.70
AMSTRAD 4600/4700....14.50
AMSTRAD 6000....17.50
AMSTRAD 7000....14.95
FERGUSON 3V00/39....8.50
FERGUSON 3V42/55....17.25
FERGUSON 3V59/FV12....27.95
FERGUSON 3V65/FV11....17.95
FERGUSON FV12L/32L....27.95
FERGUSON FV31....27.95
FISHER FVH615/910....16.50
FISHER FVH725....28.95
FISHER FVH906/916....18.50
GOLDSTAR V1221/1290....16.25
HITACHI 8000/9700....15.00
HITACHI VT11/33....15.70
HITACHI VT17/19....24.50
HITACHI VT63/64....19.25
HITACHI VT65....28.50
HITACHI VT120E/220E....21.25
HITACHI VT130E....27.50
HITACHI VT150E....36.50
JVC HRD250....23.50
LOGIK VR955....21.70
MATSUI VX735A....18.90
MITSUBISHI HS318....24.50
NEC 9034/9053....19.75
PANASONIC NV230....16.95
PANASONIC NV333....8.50
PANASONIC NV366....19.50
PANASONIC NV370....9.50
PANASONIC NV430....13.95
PANASONIC NV688....27.70
PANASONIC NV730....18.50
PANASONIC NV777....18.95
PANASONIC NV788....25.95
PANASONIC NV2000/7000....8.50
PANASONIC NVG7/9....17.30
PANASONIC NVG10/12....17.30
PANASONIC NVG18....29.50
PANASONIC NVG21/25....29.50
PANASONIC NVG30/40....21.95
PANASONIC NVG45....32.70
PHILIPS 6460/6520....9.50
PHILIPS 6462/6560 GENUINE43.50
PHILIPS 6467/6468 GENUINE38.75
SAMSUNG VI730....19.65
SAMSUNG VX510/970....17.00
SANYO VHR 1100/1300....18.50
SANYO VHR 2300/3200....18.50
SENTRA 8000/8400....16.75
SHARP VC9300/381/481....14.95
SHARP VC581/681....14.00
SHARP VCA140....14.75
SONY C5/6/7....14.75
TOSHIBA V55/57....8.50
TOSHIBA V73/83B....14.25
TOSHIBA V93B....19.75

VIDEO HEADS ARE OF THE BEST QUALITY AND ARE BRANDED OR MANUFACTURERS OWN

SERVICE AIDS
ANTEX 17W IRON....8.50
ANTEX 25W IRON....8.75
CLEAR TEST TAPE....7.95
FIBRE CLEANING PEN....3.50
HEATSINK COMPOUND....1.55
ONYX SOLDER PUMP....9.95
ONYX TIPS....1.50
SILICON GREASE....1.85
SOLDA MOP....80
SOLDER O.5KG 18SWG....8.50
SOLDER 0.5KG 22SWG....8.75
WELLER GUN TIPS (2)....1.25

NEW LISTS NOW AVAVAILABLE. PLEASE REQUEST

ALBA VIDEO SPARES
VCR4000
BELT KIT....1.95
CAPACITOR BACK-UP....1.85
PINCH ROLLER....3.95
REEL IDLER....3.95
REEL PULLEY....1.95

AMSTRAD VIDEO SPARES
VCR4500
BELT KIT....1.95
GEAR ASSEMBLY....9.95
MODIFICATION KIT....5.50
PINCH ROLLER....3.50
VCR4600
BELT KIT....1.95
GEAR ASSEMBLY....9.95
MODIFICATION KIT....5.50
PINCH ROLLER....3.50
VCR6000
BELT KIT....1.95
PINCH ROLLER....3.95
CLUTCH....3.95

FERGUSON VIDEO SPARES
3V29/30
BELT KIT....1.95
CAPSTAN MOTOR....32.50
CASSETTE LAMP....70
LOADING BELTS (5)....1.95
PINCH ROLLER....3.95
REEL IDLER....2.95
TAKE UP CLUTCH....2.95
TAKE UP IDLER....1.95
3V35/39
BELT KIT....1.95
CAPSTAN MOTOR....21.50
CASSETTE HOUSING....28.95
LOADING BELTS (5)....1.95
MAINS TRANSFORMER....23.95
PINCH ROLLER....3.95
REEL IDLER....2.95
TAKE UP IDLER....1.95
TAKE UP CLUTCH....2.95
3V44/45
BELT KIT....1.50
CASSETTE HOUSING....28.95
PINCH ROLLER....3.95
3V65/FV11
BELT KIT....1.75
CAPSTAN MOTOR....27.50
CASSETTE HOUSING....27.50
PINCH ROLLER....3.95
REEL IDLER....2.75

FISHER VIDEO SPARES
FVH5000
BELT KIT....2.20
REEL IDLER....5.50
PINCH ROLLER....3.50
TENSION BAND....2.60
FVH615/720
BELT KIT....1.95
CLUTCH ASSEMBLY....5.95
PINCH ROLLER....4.50
REEL IDLER....5.95
FVH905/910
BELT KIT....1.95
CLUTCH ASSEMBLY....5.95
REEL IDLER....5.95

HITACHI VIDEO SPARES
VT8000/8700E
BELT KIT....1.95
FF/REW IDLER....2.95
FF/REW PULLEY....95
PINCH ROLLER....3.95
PLAY IDLER....3.95
REEL TABLE....3.95
TENSION BAND....2.95
VT9300/9700E
BELT KIT....1.95
FF/REW IDLER....2.75
FF/REW PULLEY....95
PINCH ROLLER....3.95
PLAY IDLER....3.95
VT11/33E
BELT KIT....1.95
CAPSTAN MOTOR VT11E....27.50
CAPSTAN MOTOR VT33E....23.95
CLUTCH ASSEMBLY....7.95
FF/REW IDLER Genuine....2.50
PINCH ROLLER....3.95
VT63/64E
BELT KIT....1.95
CAPSTAN MOTOR....27.50
CLUTCH ASSEMBLY....7.95
FF/REW IDLER....2.50
PINCH ROLLER....3.95
VT120/130E
BELT KIT....1.95
CAPSTAN MOTOR....24.95
CLUTCH ASSEMBLY....7.95
FF/REW IDLER....3.75
PINCH ROLLER....3.95

PANASONIC VIDEO SPARES
NV230/430
BELT KIT....1.95
PINCH ROLLER....3.95
REEL IDLER GENUINE....3.30
NV333/366
BELT KIT....1.95
PINCH ROLLER....3.95
PLAY IDLER GENUINE....5.50
REEL IDLER GENUINE....1.35
NV370
BELT KIT....1.95
MODE SWITCH....3.95
PINCH ROLLER....3.95
REEL IDLER GENUINE....3.30
NV730
BELT KIT....1.95
PINCH ROLLER....3.95
REEL IDLER GENUINE....4.30
NV777
BELT KIT....1.95
PINCH ROLLER....3.95
REEL IDLER GENUINE....4.30
NV2000/2010)
BELT KIT....1.95
PINCH ROLLER....3.95
PLAY IDLER GENUINE....1.35
REEL IDLER GENUINE....1.35
NV7000/7200
BELT KIT....1.95
PINCH ROLLER....3.95
PLAY CLUTCH GENUINE....6.15
REEL IDLER GENUINE....1.35
NVG7/10/12
BELT KIT....1.95
MODE SWITCH....3.95
PINCH ROLLER....3.95
REEL IDLER GENUINE....3.30

PHILIPS VIDEO SPARES
VR6460/6520
BELT KIT....1.95
PINCH ROLLER....3.95
REEL IDLER....3.30
REPAIR KIT....12.95
VR6462/6560
REPAIR KIT....12.95
CASSETTE HOUSING....16.95
PINCH ROLLER....3.95
REEL IDLER GENUINE....4.95
VR6467/6760
REPAIR KIT GENUINE....21.50
BELT KIT....2.95
CASSETTE HOUSING....17.95
PINCH ROLLER ARM ASSY....7.50

SANYO VIDEO SPARES
VTC5000
BELT KIT....1.00
REEL MOTOR GENUINE....7.95
REEL PULLEY GENUINE....5.95
VHR1100/1300
BELT KIT....2.25
PINCH ROLLER....3.50
REEL DRIVE ROLLER....5.95
VHR3100/3700
BELT KIT....1.95
PINCH ROLLER....3.50
REEL DRIVE ROLLER....5.95

SHARP VIDEO SPARES
VC9300/381
BELT KIT....2.50
PINCH ROLLER....3.95
REEL IDLER GENUINE....3.95
REEL MOTOR GENUINE....16.95
TENSION BAND....2.95

VC481/482
BELT KIT....2.50
PINCH ROLLER....3.95
REEL IDLER GENUINE....3.95
REEL MOTOR GENUINE....17.95
VC581/582
BELT KIT....2.50
REEL IDLER GENUINE....3.95
PINCH ROLLER....3.95
VC681
BELT KIT....2.50
PINCH ROLLER....3.95
REEL PULLEY GENUINE....7.95
VCA140/VCT72
BELT KIT....2.95
PINCH ROLLER....3.95
REEL PULLEY GENUINE....7.95

SONY VIDEO SPARES
C5/6/7
BELT KIT C5/7....2.50
BELT KIT C6....1.95
PINCH ROLLER....4.50
REWIND KIT C5/7....4.95
REWIND KIT C6....3.95

VIDEO LAMPS
FERGUSON 3V00/22....50
FERGUSON 3V29....80
PANASONIC NV2000....95
SHARP 9300....1.50
UNIVERSAL....50

VIDEO LEADS
SCART LEAD FULLY WIRED..4.95
SCART LEAD TO 6 PHONO....4.95
SCART COPYING KIT....5.95
SCART TO 2 SCART SKT....5.95
SCART TO 5 SCART SKT....6.95
VIDEO COPYING KIT....5.95

VIDEO REPAIR KIT
ALBA 4000....11.50
FERGUSON 3V23....15.95
FERGUSON 3V29/30....12.95
FERGUSON 3V35/39....12.95
FERGUSON 3V44/45....14.95
FERGUSON 3V64/65....11.95
FISHER FVH615/715....12.75
FISHER FVH905....12.95
HITACHI VT8000....12.95
HITACHI VT9300....12.95
HITACHI VT11/33E....16.95
HITACHI VT120/130E....16.95
PANASONIC G DECK (GEN)..8.50
PANASONIC NV230 (GEN)....14.50
PANASONIC NV333 (GEN)....14.50
PANASONIC NV370 (GEN)....14.50
PANASONIC NV430 (GEN)....14.50
PANASONIC NV730 (GEN)....13.95
PANASONIC NV777 (GEN)....13.50
PANASONIC NV2000 (GEN)..23.95
PANASONIC NV7000 (GEN)..20.45
PANASONIC NVG10/12(GEN)12.95
PHILIPS VR6460....12.95
PHILIPS VR6462....12.50
PHILIPS VR6467....21.50
SONY C5/7....11.50
SONY C6....9.95

CELLULAR SPARES ANTENNAE
3DB BODY MOUNT....14.25
3DB GLASS MOUNT....15.95
MOTOROLA T/PORT....19.95
MOTOROLA 8500X 1/4 WAVE 9.95
MOTOROLA 8500X BUTTON..9.50
MOTOROLA 8800X....9.95
MOTOROLA 9800X....19.95
PANASONIC H SERIES....14.95
NEC P3....9.95
NOKIA 101....14.95

BATTERIES
ERICSSON HOTLINE....23.50
MITSUBISHI MT3....24.50
MITSUBISHI MT5....24.50
MITSUBISHI MT7 700MAH....23.95
MOTOROLA 4500X....39.50
MOTOROLA 4800X SLIM....27.50
MOTOROLA 8000X....24.50
MOTOROLA 8500X 1000MAH23.50
MOTOROLA 8500X 1500MAH29.50
MOTOROLA 8800X 1000MAH23.95
MOTOROLA 8800X 1500MAH29.50
MOTOROLA PSNL 700MAH..23.50
MOTOROLA PSNL SLIM....39.50
MOTOROLA 9800X 600MAH.19.50
MOTOROLA 9800X 700MAH.23.50
MOTOROLA 9800X SLIM....39.50
NEC P3 700MA....23.50
NEC P4 700MAH....23.50
NOKIA 101 700MAH....24.50
NOKIA 190....23.50
NOKIA 1320 CITYMAN....29.95
PANASONIC E/H SERIES....32.50
PANASONIC F1 700MAH....23.50
PANASONIC I SERIES....25.50
SONY CMH1....24.95
SONY CMH-333....24.50
TECHNOPHONE TP2....27.50
TECHNOPHONE TP3....24.50
TECHNOPHONE TP405 700MAH....23.50

Cellular dealers wanted

BATTERY CHARGERS DESK TOP TRICKLE
MOTOROLA T/PORTABLE....38.95
MOTOROLA 8000/8800X....23.95
MOTOROLA MICROTAC....24.50
NEC P3....24.95
NOKIA 101....24.95
PANASONIC E/H SERIES....39.95
PANASONIC F....24.50
SONY CMH-333....24.95

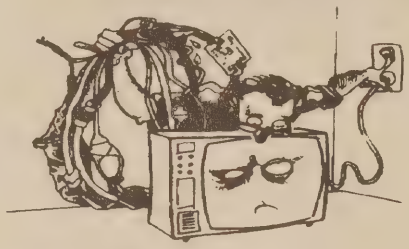
DESK TOP RAPID/COND.
MOTOROLA 8000 SERIES....42.50
MOTOROLA 9800X....42.50
NEC P3....42.95
NEC P4....44.95
NOKIA 101....42.95
PANASONIC F SERIES....42.95
SONY CMH333....44.95

BATTERY ELIMINATORS
ERICSSON HOTLINE....14.50
MOTOROLA 8000/8800X....12.95
MOTOROLA 9800X....12.95
NEC 9A....12.95
NEC P3....12.50
NEC P4....12.95
NOKIA 101....12.95
PANASONIC F SERIES....12.50
SONY CMH-1....14.95
SONY CMH-333....14.50
TECHNOPHONE TP2....12.95
TECHNOPHONE TP405....12.95

P/P CHARGES:
COMPONENTS £1.00 PER ORDER UK
SERVICE MANUALS £1.25 EACH
CELLULAR TELEPHONES £5.00 PER ITEM
EXPORT ORDERS P/P CHARGED AT COST
WHEN ORDERING:
PLEASE ADD P/P VALUE TO ORDER TOTAL THEN ADD 17.5% VAT TO THIS TOTAL
DELIVERY BY RETURN ON ALL STOCK ITEMS
***** MINIMUM ORDER VALUE £5.00 *****

TECHNICAL BOOKS

A selection from our range of books for the repair trade



TELEVISION CHASSIS GUIDE.
Full cross reference for all models
Order MP-18. £5.95.

TELEVISION EQUIVALENTS
Lists models which are the same
Order MP-150. £5.95.

FAULT LISTS FOR TELEVISIONS.
Hundreds of specific faults for dozens of different makes and models.
Order MP-205. £6.95.

TELETEXT REPAIR MANUAL.
Covers SAA range of boards.
Order MP-38. £6.95.

TELEVISION REMOTE CONTROL CIRCUITS.
Dozens of Diagrams on many remotes.
Order MP-167. £10.00.

TV POWER SUPPLY CIRCUITS.
Dozens of P.S. circuit stages.
Order MP-219. £10.00.

SCART EUROCONNECTOR SYSTEM.
Comprehensive details of the system.
Order MP-21. £3.00.

P.C. HARD DISC DRIVE REFERENCE MANUAL.
Comprehensive Drive Details.
Order MP-84. £5.00.

P.C. DIAGNOSTICS SOFTWARE.
Dozens of programs to aid you in diagnostics of PC's and Drives etc.
2 sets of 7 x 3.5" Discs per set.
Set 1. Order MP-250. £12.50.
Set 2. Order MP-251. £12.50.

VIDEO RECORDER AND CAMCORDER EQUIVALENTS.
Full Cross-reference guides.
Makes A-J. Order MP-217 £5.95.
Makes K-Z. Order MP218 £5.95.

FAULT LISTINGS FOR VIDEO.
Lists Hundereds of Faults for dozens of makes and models.
Volume 1. MP-206. £6.95.
Volume 2. MP-228. £6.95.

VHS VIDEO RECORDER PRINCIPLES.
Detailed guide on how it works.
Order MP-58. £3.95.

VIDEO TEST JIG.
Special cassette lets you operate the machine in test mode.
Order VTJ. £15.00.

VIDEO HEAD CLEANING KIT.
Special kit with comprehensive instructions on how to service heads.
Order VHCK. £4.00.

VIDEO RECORDER FAULTS.
Unique repair guide for beginners.
Order MP-5. £3.95.

WIRE ANTENNAS FOR H.F. OPERATORS.
THE aerial book for Amateurs.
Order MP-243. £5.95

REEL TO REEL TAPE RECORDER SERVICING.
Theory and circuits for repairs.
Order MP-201. £5.00.

TRANSISTOR RADIO REPAIR GUIDE.
Comprehensive servicing charts.
Order MP-7. £2.50.

RECORD PLAYER SPEED DISC.
Get your phonograph up to speed.
Order MP-8. £1.00.

SWITCH MODE POWER SUPPLY I.C. TYPE TDA-4600.
Circuitry and operation explained.
Order MP-37. £6.00.

VOLTAGE REGULATORS, STABILISERS & POWER SUPPLIES.
Identification and specifications.
Order MP-9. £3.00.

CMOS DATABOOK.
Pinouts and circuits for 4000 series.
Order MP-10. £5.00.

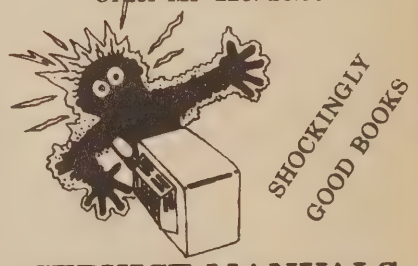
TTL DATABOOK.
Pinouts and circuits for 7400 series.
Order MP-34. £5.00.

TRANSISTOR EQUIVALENTS.
Includes details on testing them.
Order MP-24. £3.00.

OFFICE EQUIPMENT EQUIVALENTS.
Photocopiers & Fax machines covered.
Order MP-200. £6.00.

TELEPHONE CODE LOCATION GUIDE.
Find the Town from the Phone Code.
Order MP-19. £4.00.

MANUFACTURERS EQUIVALENTS.
What makes are the same.
Order MP-220. £3.00.



SERVICE MANUALS available for most equipment.

Order TODAY using Access/Visa for immediate despatch.

All orders plus £2.35 Post and Packing. (Overseas £5.00)

The above selection are just a few of the Hundreds of Unique Repair and Data Guides shown in our **FREE** catalogue - Yours for the asking.
Sent **FREE** with all orders or send 2 x 1st class stamps for your copy **TODAY!**

MAURITRON TECHNICAL SERVICES (TV)

47A High Street, Chinnor, Oxfordshire, OX9 4DJ.

Tel:- 0844-351694. Fax:- 0844-352554.

EDITOR
John A. Reddihough

PRODUCTION EDITOR
Tessa Winford

EDITORIAL OFFICE
081 652 8120
Fax 081 652 8956

Note that we are unable to answer technical queries over the telephone and cannot provide information on spares other than that given in our Spares Guide.

ADVERTISEMENT MANAGER
Carol Nobbs
081 652 8327

FIELD SALES EXECUTIVE
Patrick Irwin
081 652 3732

SALES EXECUTIVE
Pat Bunce
081 652 8339
Fax 081 652 8931

ADVERTISING PRODUCTION
Brian Chapman
081 652 8681
Fax 081 652 8917

PUBLISHING DIRECTOR
Susan Downey

SUBSCRIPTION ENQUIRIES
0444 445 566

SUBSCRIPTION HOTLINE
24-hour subscription ordering with credit card number phone 0622 721 666 and quote reference INJ.

COVER PHOTO
This month's cover photograph shows an internal view of the Pace PRD800 satellite receiver. See article on pages 248-251.

REED
BUSINESS
PUBLISHING

TELEVISION

Japanese Sandman

The Japanese economy is in a mess. Consider one or two facts. The recession has now lasted for over 32 months, the longest period of economic decline since World War II, and shows no signs of any improvement. With production falling, employment is decreasing and consumers are reluctant to spend. Even if they felt confident enough to borrow, the fact that there is at present a credit squeeze would block this possible means of improving the performance of the economy. There's a credit squeeze not for the usual reason, high interest rates because of economic overheating, but because Japan's banking system is suffering as a result of massive bad debts. There are times in economic life when nothing seems to go right. We've experienced this sort of thing often enough in the UK, though generally for rather different reasons. The Japanese economic boom of the Eighties led to asset overvaluation of a type that can be likened only to the Wall Street bubble of the late Twenties. In the Eighties Japanese share prices rose to astronomic levels that had little to do with the comparative economic performance of firms, the only realistic way of valuing them. This was observed in the West, but we tended to assume that the Japanese had their own ways of doing things and that somehow these gross overvaluations were acceptable. They weren't, of course: reality will intrude sooner or later. But the problem was that Japanese banks had over-invested in securities as prices rose. So had the firms to which they lent: during the boom years some major firms were making greater profits from share dealing than from their core activities. To make matters a great deal worse there was, again like the USA in the Twenties, a simultaneous property boom which the banks fuelled by lending to speculators.

The bubble bursts when an excessive rise in asset values is no longer sustainable and when confidence, which is all that underpins an asset-value boom, for one reason or another declines. Several scandals helped to start the collapse. And once a collapse starts you get the domino effect. The banks have been left with a mass of bad debts, hence the present credit squeeze. Unfortunately the bad debts are still building up faster than the banks are able to write them off. There are reputed to be something like £300bn of bad debts amongst the leading banks, and it's expected that this will affect their performance for the next five-ten years.

Under normal circumstances you can reverse a recession by lowering interest rates. But Japanese interest rates are already negligible – the official discount rate is 1·75 per cent. It's ironical that Japan's trade surplus continues unabated. Because of this the value of the yen can't be lowered to stimulate industry and interest rates can't be lowered – even if there was room for this. There are indeed times in economic affairs when it's difficult to know which way to turn. Generally one has to wait for economic conditions to sort themselves out naturally, which can be a painfully slow process.
Who would have imagined all this in the Seventies and Eighties, when the Japanese economy was forging ahead and taking over the role of the engine of world trade? There was talk of the 21st century being the century of Japanese world domination – that, anyhow, was how the chairmen of Sony and Matsushita saw things. For the West it was a worrying prospect. But at least the Japanese realised that they couldn't monopolise production, which in consequence was spread abroad. In a way it's reassuring to know that Japan is subject to the same economic laws as the rest of us. Now the worry is that the Japanese economy could tip from recession to a full-blown depression because of waning demand, over capacity and excessive stocks. Though their profitability has fallen dramatically, the major Japanese firms seem to be secure enough for the present: the pressure is being felt by the smaller firms and subcontractors, which are losing work as the major firms rely more on their own off-shore plants.

There's no solace to be gained from Japan's economic woes. But at least the threat of Japanese economic hegemony has been removed, for the present at any rate. It is now up to Western manufacturers to make the most of their opportunities. Unfortunately the problem of mature markets and a lack of new developments affects us all. Will the much-vaunted multimedia revolution and increasing opportunities in the service sector provide a way out?

Teletopics

EUROPEAN TV PRODUCTION EXPANDS

Several recent moves suggest that Europe is about to become an increasingly important base for the production of TV receivers. First Gooding Consumer Electronics (GCE), a Welsh firm, has acquired Grundig's factory at Creutzwald in north east France. GCE intends to increase production from the present capacity of 500,000 sets a year to a million within three years. As part of the agreement the factory will continue to produce sets for Grundig until the end of 1994. GCE will then switch to the production of 14, 20 and 21in. sets of its own design for the volume market. The company starts with the advantages of a high-quality, recently modernised factory and a trained workforce. At present, most smaller-screen sets sold in Europe are imported from east Asia. Alfred Gooding, joint owner of GCE with Koen van Driel, a former managing director of Grundig UK, says that with modern, sophisticated production equipment and a well-managed labour force it should be possible to compete with east Asia, which has the disadvantage of having to ship sets half way round the world. GCE has also bought the Minerva brand name from Grundig and the Continental Edison brand name from Thomson of France.

Alfred Gooding has other electronics interests, based in south Wales: Gooding Sanken, a jointly owned company that manufactures power supply units, and Race Electronics, a contract manufacturer that is at present manufacturing, amongst other things, 10,000 satellite TV receivers a week – customers include Dixons and Comet. The satellite receiver activity is significant since it will enable GCE to put together satellite/TV set packages. The group expects to achieve a turnover of £130m this year.

Meanwhile Daewoo has taken an interest in a TV plant at Pruszkow, near Warsaw, Poland. Production of Daewoo TV sets at a rate of 250,000 a year is due to start next month. Further investment over the next few years could boost output to 600,000 sets a year, eighty per cent of which would be exported, mainly to western Europe.

And as part of Samsung's plans to expand production in Europe the company has recently acquired an east German manufacturer of glass for colour TV tubes.

DEVELOPMENTS

Intel and General Instrument have jointly developed equipment to link personal computers to cable TV networks. The technology enables data to be transmitted a thousand times faster than using standard telephone lines. Two leading US cable TV operators are to field test the equipment later this year.

British Telecom is to carry out a field/commercial trial of its video-on-demand system later this year. It will involve some 2,500 houses in the Colchester, Essex area. BT has already demonstrated the transmission of good-quality TV pictures via ordinary telephone lines while these are also in use for ordinary telephone conversations. The aim is to offer subscribers a wide range of entertainment and information services from a central data base for a fee. In the USA Bell Atlantic plans to have a similar service in operation by the end of the year, covering a million households. The aim is to extend this to eight million households by the year 2000.

NTL and Pace Micro Technology Ltd. have formed a partnership to work together on digital TV reception equipment. NTL will be supplying the video compression technology and Pace the design, manufacturing and distribution. Initial production units should be available later this year. Satellite broadcasters plan to start direct-to-home digital services next year.

AT&T Microelectronics, LSI Logic and SGS-Thomson Microelectronics have all announced details of chip sets for MPEG-2 video decoders.

FIRST W-VHS VCR

JVC recently launched the world's first W-VHS VCR. The W-VHS format is designed to handle Japanese HiVision HDTV signals, using metal powder instead of the conventional ferric oxide tape. Model HR-W1 has several recording modes however. The HD mode is used for recording HiVision transmissions when connected to a HiVision TV receiver – the JVC HV-32Z3 TV set has an AV Compulink system for timer recordings. The SD mode is used for recording NTSC signals and is claimed to offer improved picture quality in comparison with a conventional VCR system. The HR-W1 can also record and playback in the S-VHS and VHS modes. It has newly-developed, five-layer Sendust heads and the hi-fi VHS audio system. Dimensions are 445 x 182 x 463mm, power consumption 84W and the price in Japan the equivalent of about £3,875. A three-hour W-VHS tape costs £37, a two-hour version £30. There are no plans at present for a European launch of the system.

DISC SYSTEMS

Kodak has developed an 80cm version of its Photo CD disc. The new disc holds up to 36 photographic images and is intended for use with notebook and laptop computers and personal digital assistants – the standard 120cm disc holds 100 images. The 80cm discs are compatible with CD-ROM, Photo CD and CD-i players, most of which have a disc tray slot for smaller discs. A plastic ring adaptor enables the miniature discs to be used with older machines. The new discs are expected to be available by the end of the year.

The Philips digital video cartridges that enable CD-i decks to play full-motion video titles are at present in short supply.

CONGRATULATIONS RICHARD!

Richard Flowerday, who contributes to our fault finding pages, has been named Sony European Video Technician of the Year. Richard runs Harborne TV Services, Birmingham which he set up after being made redundant in 1986. The award was won in Amsterdam after answering questions on video engineering and tracing three video faults in thirty seven minutes.

IN BRIEF

Philips' Voice Commander, a voice-operated remote control unit, has gone on sale in the UK at £99. . . A new conference entitled 'Television Distribution Technology' will run alongside the Cable and Satellite '94 Exhibition which is being held at Olympia on April 11-13th. . . Mauritron Technical Services, 47A High Street, Chinnor, Oxfordshire OX9 4DJ (0844 351 694) has issued a new technical publications catalogue (edition 18). It's full of items that should be of interest to readers.

WILLOW VALE ELECTRONICS LIMITED

WVE

WVE

the answer to the spares puzzle

Akai	Kamasa
Altai	Konig
Amstrad	Labgear
Antex	Leader
Antiference	Ledu
A.D.S.	Link Hamson
Aiphone	Microtec
Ambersil	Mitsubishi
Aiwa	Nikkai
Alba	Oryx
AWI	Pye
Baldwin Boxall	Philips
Bose	Portasol
BK Precision	Ross
Blackstar	Saisho
Celtel	Samsung
Celtek	Sansui
DNH	Satfinder
Electrolube	Seaward
ERL	Servisol
Ferguson	Sharp
Fidelity	Shure
G.E.C.	Sony
Goldstar	Thander
Grundig	Thompson
Hameg	Toshiba
Inkel	Trantec
J.V.C.	Weller

WILLOW VALE
ELECTRONICS LIMITED

'The Better Choice'

HEAD OFFICE:
11 Arkwright Road, Reading, RG2 0LU.
Tel: 0734 876444 Fax: 0734 867188
ACCOUNTS DEPARTMENT:
Tel: 0734 860158

MANCHESTER BRANCH:
Unit 4 Enterprise Park, Reliance Street,
Manchester, M10 0AL.
Tel: 061-682 1415 Fax: 061-682 9031

NOTTINGHAM BRANCH:
11 Marhill Road, Carlton,
Nottingham, NG4 3AJ.
Tel: 0602 870789 Fax: 0602 878772

VCR Clinic

Reports from Eugene Trundle, Terry Lamoon, Brian Storm, Gerald Smith, Chris Watton, Michael Dranfield, Nick Beer, Simon Bodgett, J.K. Potts, Fauz Ahmed Sumar, John Edwards, John Hopkins and Bob McClenning

Mitsubishi HSB21

The same deck is used in a wide range of Mutsubishi HSB models, so the following problem could probably happen with any of them. When the machine was set to play it would lace up then produce a broken-up still picture (tape stationary) before shutting down again. Sometimes the tape would struggle forwards, producing a very mistracked picture with no sound and no tape-counter action. It didn't touch the capstan or the audio-control head. The cause of all this was that the half-loading arm (C033 in the exploded diagram of the deck) didn't retract fully at eject, so that it was unable to catch and pull the tape when a cassette was next loaded. It was caught behind the take-up tension regulator arm (C031) which moved too far to the left because its brake pad had come adrift, allowing the metal shoe to bear on the rim of the take-up turntable. **E.T.**

Hitachi VTM820

A long search for the cause of a very intermittent squealing noise from this machine's deck, accompanied by a rippled picture, led us to the shaft of the white plastic impedance roller just upstream from the entry tape guide. Giving it a clean, a polish and a single tiny drop of light oil cured the problem. **E.T.**

JVC HRD520

This machine produced off-tape pictures that were marred by multiple thin mistracking bars spaced progressively closer towards the top of the screen. The cause was failure of the entry guide to go fully home – its base jammed in the plastic guide rails that had become distorted or warped. Some careful paring with a file or a very sharp knife gets things moving again. **E.T.**

Samsung SI/SX7220

It took us weeks to find the cause of this machine's very intermittent fault: the tape would run at very high speed to give a search-forward effect, with the sound still present – fast and high-pitched. A dry-joint in the capstan FG feedback line on the 'deck-joint' PCB which sits behind the capstan motor was responsible. It wasn't obvious to the eye: re-make the joints between the board and motor connector CN213. **E.T.**

Hitachi VT63/64

Two other firms had attempted to repair this old-timer, which would sometimes fail to play or record when asked. Between them they had replaced all the belts, the reel idler, the capstan motor drive chip and the thermistor that feeds power to this chip. The real culprit was the capstan motor, which when put on test drew over 1A from a 4V supply! **E.T.**

Panasonic K Deck

The first machine fitted with this new deck came into the workshop recently. It was damaging tapes. When we opened it up and watched the loading we saw that the loading arm pulled the tape up to the control head but didn't lock into place fully. On careful examination it could be seen that the arm was slightly bent over. Realigning it provided a complete cure. It wouldn't surprise us if this became a regular problem with the deck, especially if users try to retrieve tapes from semi-loaded machines as some do. The construction of this arm (P5) is not rigid. **T.L.**

JVC HRD860

The problem with this machine was no E-E sound while the recorded sound buzzed. I checked the sound along to IC6 where it disappeared. Further checks showed that the supply here was low at only 2V. Following this back I found that the full voltage appeared at the connector to the panel. The plug was covered with a gluey substance, presumably to stop it moving. When this had been cleaned off the fault was no longer present. What amazes me is how the machine could work for months before the substance decided to foul up the sound completely. Funny business! **T.L.**

Panasonic NVL20

There was a very poor picture in the review mode while, more seriously, the machine would sometimes throw out tape into the mechanism, much to the detriment of the tape. A careful check on the tape's progress along its path failed to reveal any obstructions or resistance: all the brakes and soft brakes were working faultlessly. The culprit was eventually found to be the head drum entry guide, which had seized. As the guide didn't rotate, the tape's progress was somewhat unstable as it stuck and jumped randomly over the guide. A replacement guide, part no. VXP0863, restored correct operation. **B.S.**

Panasonic NVJ40

This machine intermittently powered down when a tape was inserted. Preliminary checks showed that the head drum didn't start as the tape was loaded – in this machine the tape is fully loaded round the head in the stop mode. Inserting the tape a couple of times would get the machine to work.

As the condition and alignment of the mode switches seemed to be o.k. suspicion fell on the systems and servo control, in particular the microcontroller chip IC6001, but again the verdict was not guilty. I still felt that there had to be a problem with the mode switches. A look at the carriage mode switch, which I'd already replaced, showed that it seemed to be less securely mounted than usual. Holding it securely with my finger as I loaded a tape proved the point: the machine worked faultlessly. A replacement right side cassette housing, part no, VXA4468, cured the problem. The cause of the trouble was the excessive play in the mode switch mounting. **B.S.**

GoldStar GHV1244

This machine wouldn't accept tapes and kept going into the standby mode. An examination showed that the shaft-

connect cog on the right-hand side of the lift had a broken pin and spring. A replacement cog and spring assembly and alignment of the lift cogs cured the problem. **G.S.**

Nokia 3722/42

There were no functions and the machine wouldn't accept a tape or power up. The clock display showed four small zeros. A check showed that the back-up 5V supply was low. D7001 was found to be open-circuit while the back-up capacitor C7001 was gradually discharging and not being recharged via D7001. Replacing D7001 cured the problem. You get the same fault when C7001 is leaky. **G.S.**

JVC HRD400

There was no play, fast forward, rewind or eject, the machine going to standby after a few seconds. We found that the reel brakes were jammed on hard and the idler was jammed on the brake mechanism. The clutch spring, which is used along with the 'windmill' to release the reel brakes, was broken and when the mechanism had been stripped down I found that the main cam was also damaged. The slide encoder, the main cam and the clutch spring were replaced and after realignment of the mechanism everything worked correctly. **G.S.**

Nokia 3722/42

A fault we've had with a number of these machines is loops of tape left hanging out when the cassette is ejected. There are two common causes. First a stiff capstan motor. As a result there's no take-up on eject. The cure is to replace the capstan motor. The second cause is a faulty mode switch. This switch can also be responsible for erratic functions, failure to accept tapes and failure to eject them. **G.S.**

Sanyo VHR3100

The cassette would go in only about a quarter of an inch then come out again. On investigation we found that the capstan to idler belt had become very soggy: it had glued itself to the capstan pulley which couldn't turn. A good clean up and some new belts made the machine as good as new. **C.W.**

Ferguson 3V44/JVC HRD140/NordMende V1001

This machine was brought to us because of loss of colour. A tap on the top panel would restore it temporarily, but even after a mass soldering operation the colour was still tap-sensitive. So methodical checks had to be carried out. This brought me to filter BP301, which must have had a poor internal contact. Anyway a replacement restored reliable colour. **C.W.**

Sanyo VHR1100

For tracking errors check both the supply and take-up guide rollers which tend to become loose at the pole base. In the past we've tried to glue them back but this is not a good idea. Replacement of the pole base assemblies gives a reliable cure. **M.Dr.**

Akai VS967

If the capstan motor works in the fast forward and rewind modes but won't turn in the play mode check the fusible resistor FR4 in the power supply. It will almost certainly be open-circuit. **M.Dr.**

Saisho VR3600/Matsui VX755

When this machine had been running for about an hour the capstan motor would momentarily stop for about a second then start to turn, repeating the sequence about every six revolutions to give a play/pause symptom. We've had this fault on many occasions, also with Sharp/Philips machines that use the same (M51782ASP) capstan motor drive chip. Cooling the chip will cure the fault for a while, but beware: on the first occasion we spent some £18 on a new chip only to find that the replacement didn't provide a cure – despite the fact that cooling it restored normal operation. We now replace the motor, which is not much dearer than the chip. **M.Dr.**

Samsung VI910

Field roll was the complaint with this playback-only machine. The cause was insufficient back tension because of sticky grease on the back-tension post bearing. Cleaning and relubrication provides a cure – the cleaning needs to be thorough. **N.B.**

Panasonic NVJ35B

This machine came in dead. That there was no operation on the primary side of the power supply was indicated by absence of the squeal at switch on. We found that diode D1104 (type AP01C) in the snubber network was short-circuit. **N.B.**

Sony SLC30

These machines now suffer from a common affliction that's often not mentioned by the customer. When the machine is repowered after being unplugged the E-E and playback vision are sometimes marred by severe diagonal patterning, at both r.f. and baseband, the latter usually being better. The cause is C319 (22µF, 16V) in the power supply. It goes low in value or open-circuit. **N.B.**

Philips VR6180/Pye DV186

There was no playback f.m., just noise. The cause of this was the fact that the lower drum earthing bracket's securing screw was very loose. When this was tightened there was a nice clean picture but no colour. Recordings were fine when played back on another machine. I found that the f.m. from the head amplifier was about fifty per cent down and rather noisy: this was triggering the colour killer, though the luminance seemed to be perfectly all right. After much searching around I found the cause of the problem. Someone had soldered the leads from pins 1 and 2 of L6 to the print side of the PCB. Fitting them to the connector itself restored the colour. Perhaps a previous attempt to cure the loss of f.m. had gone awry? **N.B.**

Toshiba V209

There was no mechanical action. Checks showed that the 9V output from the power supply was very low. Disconnecting this supply restored the voltage, but there was no excessive load. A replacement STK7253 multiregulator chip cured the fault. **N.B.**

Panasonic NVJ40/42/45/47

In this range of machines a drum motor that appears to be lazy or is mechanically noisy is rarely due to the drum itself. The cause of the fault usually lies in the drive circuit on the small PCB behind the mechanism. You will probably find that one of the three electrolytic capacitors C204/5/6 (0·1µF, 50V) is faulty. **N.B.**

JVC HRD820

This machine suffered from an intermittent loading fault: it would also stop dead in play for no obvious reason. We suspected the syscon sensors but it was the microcontroller chip itself that was faulty. **S.B.**

Panasonic NVJ40

This machine came in with a tape stuck inside. The cause of the trouble turned out to be the capstan motor. Tape loading was o.k., driven by the capstan motor, but once loading was complete and play commenced the motor wouldn't run at the slower speed. **S.B.**

Panasonic NVL25HQ

If there is no output from this machine's power supply it's as well to go straight to C9 (1µF, 350V). It's positioned between two high-wattage resistors that cook it gently, drying it out. **J.K.P.**

Hitachi VT410

There was sound but only a blank white raster. I inserted our colour-bar test tape and checked at the video output socket with a scope. Only a chroma signal was present. This was strange, as one would have expected to see flickering colour on the monitor's screen. The scope was next used to check the luminance signal path. The signal was present at pin 7 of the HT4848B chip IC202 but didn't emerge at pin 1. After confirming that its supply was present we replaced the chip. This restored normal operation. **F.A.S.**

Hitachi VT9500

Fast forward and rewind were o.k. but when play was selected the tape loaded to the heads then unloaded as there was no drum rotation. A check on the supply at pin 4 of the drum chip IC503 produced a reading of 0V instead of 9V. The cause of the fault was the STK5720 regulator chip IC901 on the syscon PCB. **F.A.S.**

JVC HRD211

There was a fast forward/rewind fault with this machine. These modes could be selected and worked, but when stop was selected the tape would thread to the drum and no tape end was sensed - the loading motor would start to screech, then the machine would switch off. The cure was to replace the M50731-626SP mechacon chip. **F.A.S.**

Ferguson FV12L/JVC HRD230

In the E-E and playback modes a single, large hum bar travelled from the bottom to the top of the display on the monitor's screen. A check on the switched 5V line showed that a distorted 500mV, 50Hz squarewave was present. We initially suspected C14 which decouples the switched 5V output at pin 3 of the STK5481 chip IC1. It was o.k. however, the cause of the fault being the chip itself. **J.E.**

Panasonic NV830B

There were snowy E-E and loop-through pictures. This time the cause wasn't the r.f. booster module itself but absence of the 12V supply at its ANT BS input because the RD13EB3 zener diode D1110 was short-circuit. Note that there are two 12V supplies to the module, the always 12V supply and the ANT BS supply which is switched – this is why the fault didn't affect tape playback. **J.E.**

Sanyo VHR3100

The fault with this machine was no rewind. I tackled it the hard way. First I checked the idler assembly and all the parts around it, then I ordered the service manual. This isn't exactly comprehensive, so it took quite a lot of observation to discover what was wrong.

On the underside of the mechanism there's an assembly that consists of a main slide on top of which (with the unit upside down) there's a sub-slide. This has an elongated hole and is held in place by a pin, washer and plastic retaining clip. In the fault condition the sub-slide rode over the pin because the space between the washer and the sub-slide was too great. I carried out a temporary repair by fitting a compression spring between the washer and the plate to hold the sub-slide tighter against the main slide. This worked very well.

I then sent a fax to Sanyo to ask what I should have done. A short time later I received a phone call from Sanyo's Technical Department to tell me that the fault was not an unusual one and that all that was necessary was to push the retaining pin back against the sub-slide and fit a circlip on the other side of the deck to hold it in place. Many thanks Sanyo for a prompt, efficient and polite service. **J.H.**

Mitsubishi HS337

The customer's complaint was that while the sound was o.k. the picture had slowly "evaporated". There was no E-E or playback output though there was a signal at the scart connector. So we knew that the signal was there but wasn't getting to the modulator. The cause of the fault was C2E5 (100µF, 25V). Being close to a power transistor it had slowly and surely baked dry! **B.McC.**

Ferguson 3V48/JVC HRD565

The following fault caused us some sleepless nights. The machine came in with a damaged timer door and PCB. Putting this right was quite easy but when we tested the machine we found that while instant and normal recording worked fine all we got with a timer recording was garbage. The mechanism sprang into action correctly, and checks showed that all the record voltages were the same as with an instant or normal recording. A clue was that when coming out of the timer record mode the E-E display had swirling interference on it: this cleared when the machine was set for another function.

We eventually traced the cause of the fault to C10 which is connected to the switched 5V rail. It allowed parasitic oscillation to get into the f.m. modulator with a timed recording only, destroying any chance of a successful recording. The display gave the impression that there were the remnants of a picture behind the scrambled garbage. **B.McC.**

MANOR SUPPLIES

MKV PAL COLOUR TEST GENERATOR FOR DOMESTIC TV & VCR.

TEST DEMONSTRATIONS AT 172 WEST END LANE

- ★ 40 different patterns and variations.
- ★ Fully interlaced sync pulses with correct picture blanking
- ★ EBU colour bars, BBC colour bars, whole rasters & split bars (specially useful for VCR service), white, yellow, cyan, green, magenta, red, blue and black
- ★ Chequerboard
- ★ Mono outputs with border castellations, cross hatch, grey scale, vertical lines, horizontal lines and dots. UHF modulator output plugs straight into receiver aerial socket.
- ★ Additional video output for CCTV & VCR.
- ★ Facilities for sound output.
- ★ Easy to build kit, standard parts. Only 2 adjustments. No special test equipment required.
- ★ Mains operated with stabilised power supply.
- ★ All kits fully guaranteed with back-up service.
- ★ Also available with VHF Modulator.

Price of Kit	**£79.00**
Case (10″×6″×2¼″) app	**£19.00**
Optional Sound Module (6MHz or 5.5MHz)	**£5.90**
Built & Tested in Case including Sound Module	**£129.00**

Post/Packing £4.50
Add VAT 17.5% TO ALL PRICES

PAL COLOUR BAR GENERATOR (Mk4)

- ★ Output at UHF, applied to receiver aerial socket.
- ★ In addition to colour bars R-Y, B-Y etc.
- ★ Cross-hatch, grey scale, peak white and black level.
- ★ Push button controls, battery or mains operated.
- ★ Simple design, only five i.c.s on colour bar P.C.B.
- ★ Backup service available.

PRICE OF MK4 COLOUR BAR GENERATOR KIT £39.00. CASE £5.80. BATT HOLDERS £4.20

MAINS SUPPLY KIT £5.80 (Combined P&P £4.50)

VHF MODULATOR (CH 1 to 4) FOR OVERSEAS £6.80.
EASILY ADAPTED FOR VIDEO OUTPUT & C.C.T.V.

ADD VAT 17.5%

LINE OUTPUT TRANSFORMER TESTER

NEW

- ★ Service Aid.
- ★ Saves time and money.
- ★ Checks short turns.
- ★ Simple to use.
- ★ Reliable.
- ★ Battery operated.
- ★ Pocket size.

PRICE £24.00
POST/PACKING £2.50

ADD VAT 17.5%

INFRA RED REMOTE CONTROL TESTER

NEW

- ★ Pocket size.
- ★ LED + audible indication.
- ★ Simple to use.

PRICE £20.00
POST/PACKING £2.50

KITS AND PROJECTS

SAW IF AND TUNER UNIT complete and tested for video & audio outputs **£28.50** p.p. £1.80.

PAL DECODER KIT (Video to RGB) for Monitors **£27.00** p.p. £1.80.

PAL ENCODER KIT (RGB to Video) **£20.00** p.p. £1.80.

CRT TESTER & REACTIVATOR KIT For Colour & Mono complete with Case, Panel Meter Indicator – can be adapted for latest CRTs **£45.00** p.p. £4.50.

TV & VIDEO SPARES

REMOTE CONTROLS

Replacement for: Ferguson, Hitachi, Philips, Panasonic, Grundig, ITT, Sony, Saisho, Granada, Saisho + many others
Phone for make and model no.

PHILIPS SPARES

MANUALS CF1, CTX-E, CTX-S, CP90, CP110, GR1AX, G90AE, 2B, 3A, NC3-CR, G110 **£7.50** p.p. £1.80, 2A **£10.50** p.p. £1.80,
BACK UP BATT. 2.4V **£3.80** 1.2V **£2.00** p.p. 90p
K30, KT4, CTX-EHT Lead **£4.90** p.p. £1.00

THORN/FERGUSON SPARES

TX10 Focus control **£8.50** p.p. £1.80
TX9/10 Remote & tuning 1515N **£5.00** p.p £1.80
TX10 Stereo Audio Board **£3.50** p.p £2.50
TX100 Chopper TX **£15.80** p.p. £2.50

IC SELECTION

AN5521	£3.80	SAA5243	£23.50	TA7680AP	£5.80	TDA2600	£6.80	TDA4610	£6.80
AN5900	£2.20	SAB3035	£9.80	TA7861P	£7.80	TDA2611A	£1.90	TDA4950	£1.60
BA6209	£3.80	SAB3037	£8.80	TA7698P	£6.80	TDA2640	£3.20	TDA5510	£12.50
BA6219	£3.80	SAF1032	£4.50	TA8739P	£4.50	TDA2653A	£5.80	TDA5850	£2.80
BA6229	£3.80	SAF1039	£2.20	TBA120S	£1.20	TDA2654	£5.70	TDA7052	£2.50
BA6238A	£2.80	SL470/471	£4.00	TBA750	£2.20	TDA2655B	£16.60	TDA8153	£7.80
BA6239	£3.80	SL486	£3.20	TBA920	£2.80	TDA2670	£3.20	TDA8170	£3.00
CCUFRG07	£14.40	SL490	£3.80	TBA950	£2.20	TDA2680	£3.80	TDA8180 Kit	£7.50
CNX62	£4.80	SL1430	£2.40	TCA270	£1.80	TDA2690	£3.80	TDA8190	£3.80
HA11211	£2.80	SL1432	£2.40	TCA800	£6.80	TDA2780	£6.80	TDA8305	£9.80
HA11423	£3.80	SN76226DN	£1.80	TDA1035T	£2.40	TDA3190	£4.20	TDA8341	£4.20
HA51338SP	£21.50	SN76705	£9.80	TDA1037	£1.90	TDA3301	£6.80	TDA9403	£3.80
LA4445	£3.80	STK5325	£6.80	TDA1044	£2.90	TDA3303	£19.80	TDA9503	£3.80
LA4520	£3.80	STK5326	£6.80	TDA1060	£3.80	TDA3330	£12.50	TDA9513	£4.80
LA7800	£1.80	STK5332	£6.80	TDA1082	£4.80	TDA3500	£6.80	TLA1009	£2.20
LA7520	£2.80	STK5333	£8.80	TDA1170S	£1.80	TDA3505	£4.50	TLA1014	£3.50
LA7801	£3.50	STK5338	£6.80	TDA1180	£2.20	TDA3510	£9.80	TLA1039	£2.80
LA7820	£3.80	STK5337	£7.00	TDA1190Z	£2.20	TDA3540	£2.50	TLA2018A	£2.20
LA7830	£2.80	STK5339	£6.80	TDA1432P	£5.70	TDA3541	£3.50	TLA2029	£5.80
M104B1	£6.80	STK5342	£4.80	TDA1512	£3.20	TDA3561A	£5.80	TLA2164	£3.95
M293B1	£15.80	STK5392	£6.80	TDA1515	£4.50	TDA3562A	£5.80	TLA2165A	£6.80
M490BB1	£14.80	STK5421	£6.80	TDA1524	£6.80	TDA3565	£3.80	TLA5115	£6.80
M491BB1	£9.80	STK5422	£8.50	TDA1670A	£3.20	TDA3566	£5.80	TMS1000N21.1	£3.80
M494	£9.80	STK5471	£6.50	TDA1701	£3.80	TDA3571	£4.20	TMP47C432AP-	
MC13002P	£5.80	STK5481	£5.80	TDA1770A	£3.20	TDA3576B	£9.80	8188	£21.95
MDA2062	£3.80	STK5482	£5.80	TDA1870	£6.80	TDA3640	£5.20	TMP47C432AP-	
ML237	£3.80	STK5490	£7.80	TDA1872	£9.80	TDA3650	£9.80	8189	£15.50
ML926	£4.80	STK6962	£3.80	TDA1908	£2.80	TDA3651	£4.20	TMP47C434N-	
MN15425	£15.80	STK7308	£6.80	TDA1940	£3.20	TDA3653A	£3.80	3555	£16.80
SAA1024	£5.80	STK7348	£10.80	TDA1950	£3.50	TDA3653B	£3.20	TMP47C434N-	
SAA1025	£5.80	STRD4420	£4.80	TDA2004	£2.80	TDA3654	£3.20	3559	£15.80
SAA1124	£3.50	STR3125	£4.80	TDA2040	£7.80	TDA3810	£5.50	TUA2000	£8.50
SAA1250	£3.80	STR441	£15.80	TDA2150	£3.20	TDA4420	£2.20	U4606	£14.80
SAA1251	£8.40	STR450	£11.40	TDA2270	£3.80	TDA4426	£3.20	UC3844	£2.50
SAA1293.02	£8.80	STR451	£14.80	TDA2540	£2.20	TDA4427	£3.20	UPC1363C	£5.80
SAA1293.03-		STR454	£14.80	TDA2548	£5.80	TDA4442	£2.80	UPC1363CA	£5.80
	£16.80	STR4211	£6.80	TDA2576A	£7.80	TDA4443	£7.80	UPC1378	£1.90
SAA5000	£6.80	STR5412	£9.00	TDA2577A	£4.80	TDA4500	£5.80	UPC1394	£3.80
SAA5010	£5.80	STR40090	£6.80	TDA2578	£3.80	TDA4501	£7.80	UPC1420CA	£12.20
SAA5012	£5.80	STR50020	£6.80	TDA2579	£3.80	TDA4502A	£13.50	UPC1488	£3.20
SAA5020	£5.80	STR50103	£5.80	TDA2581	£6.80	TDA4503	£5.80	UPD1397C	£4.80
SAA5030	£6.80	STR54041	£6.80	TDA2582	£2.80	TDA4505	£6.80	IC p.p 90p	
SAA5040	£6.80	STR58041	£6.80	TDA2593	£1.50	TDA4555	£9.80		
SAA5050	£11.80	STR59041	£6.80	TDA2594	£3.80	TDA4600	£3.85		
SAA5231	£7.80	STR6020	£7.80	TDA2595	£4.80	TDA4601	£2.80		

LINE OUTPUT TRANSFORMERS p.p. £1.80

AMSTRAD 2200	£21.80	PANASONIC TLF 14586F	£29.00
B&O LX2500, 2800 AT2077/81	£28.80	PHILIPS KT3	£13.80
BUSH AT2079/10	£34.80	PHILIPS K30	£22.80
DECCA 100	£10.80	PHILIPS CTX-E/S	£24.80
FIDELITY ZX2000	£15.50	PHILIPS KT4	£22.50
FIDELITY ZX3000	£14.50	PHILIPS 2A	£25.80
HINARI CT4, CT5	£24.80	PHILIPS K40	£27.50
HITACHI CPT1455, 1456, 1476, 1491	£18.50	PHILIPS 3A, 2B	£23.80
HITACHI CPT1446/46 PN2432981	£21.80	PHILIPS CF1	£23.80
HITACHI CPT2174/76/78	£18.90	PHILIPS CP90	£28.50
HITACHI P/N2433752	£21.80	PHILIPS CP110	£29.80
ITT Compact B.110	£19.80	PHILIPS GR1AX	£25.90
ITT Compact 80, 110	£17.80	PHILIPS NC3	£22.50
ITT Compact 80, 90	£22.80	SAISHO/MATSUI 3214002	£21.80
ITT Compact 80, 110 FST	£19.80	SAISHO/MATSUI P/N 3214009	£24.80
ITT CVC 20	£9.80	SANYO CTP2144, 2145, CPT6144	£28.80
ITT CVC 25, 30, 32	£10.86	SANYO CTP7132, 80P Chassis	£39.80
ITT CVC 800, 801, 803	£24.00	SONY KV1412	£21.80
ITT CVC1100, 1106, Picos	£18.50	SONY KV1440, 1460/62	£21.80
ITT CVC1150, 1175	£22.80	SONY KV1882	£24.80
ITT CVC1200, 1201, Mini 2	£18.50	SONY KV2056, 2062, 66	£32.00
ITT CVC1204	£11.50	SONY KV21XRTU	£52.00
ITT CVC1210/12/15/17	£19.80	SONY KV2252/56, 2752/56, 2762/66 PE3	£29.00
ITT Digi 3, 110	£19.80	SONY KV2704	£29.00
ITT Core 100, 90	£19.80	SONY KV27XRTU	£59.80
ITT Core 110 FST	£19.95	THORN ICC5 – 2 TYPES	£24.00
ITT TX3326/7	£22.80	THORN TX9	£23.50
ITT TX3446	£22.80	THORN TX10 (Chopper)	£19.80
ITT Monoprint A	£21.80	THORN TX85	£19.80
ITT Core 110 FST	£19.95	THORN TX89	£23.50
January offer – buy LOPTS now & get 15% discount off marked prices		THORN TX90 14″	£19.80
LOEWE Profi, Classic, Contur, etc (Quote model No.)	£33.00	THORN TX90 20″	£17.00
LUXOR P/N5340.10.01	£33.00	THORN TX100, 110 Green Spot	£17.00
MATSUI 1456	£32.50	THORN TX100 90 EST Yellow Spot	£21.80
PANASONIC TLF14520UF, TLF14568F	£29.00	THORN TX100 EST T6045L	£21.80
PANASONIC TLF14521F, TLF14567F	£29.00	THORN TX100 Blue Spot	£21.80
PANASONIC TLF14584F	£29.00	THORN 51P7	£32.00

TRIPLERS EHT MULTIPLIERS p.p. £1.80

CONTINENTAL UNIVERSAL TVK & BG
RANGE (Quote exact no.) **£13.80**
U.K. UNIVERSAL (best quality) **£7.80**
DECCA/TATUNG BG 200/44 TYPE **£7.80**
GRUNDIG BG 2077-642-1003/1004 **£16.80**
GRUNDIG BG 2087-642-1001/1002/1006 **£16.80**
THORN 9000 **£9.80**

MISCELLANEOUS p.p. £1.80

MAINS TRANSFORMERS: 6.3 Volts CRT boost **£6.80** p.p. £1.80
£6.80 p.p. £1.80
Mains Isolating 500VA **£51.25** p.p. £5.25
455 CRYSTALS for handsets. 4 for **£2.00** p.p. 80p
DEGAUSSING ROD £33.75 p.p. £3.50
TRANSPARENT VIDEO SERVICE CASSETTE
TV FAULT FINDING GUIDE £14.80
VCR FAULT FINDING GUIDE £14.80
HITACHI FRAME MODULE HM 6251, HM6232 £9.80
HITACHI THERMISTOR TH902 £2.40

HOW TO ORDER: ADD p&p TO ORDER + VAT 17.5% TO THE TOTAL
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Telephone 071-794 8751/794 7346
Fax 071-431 5778

Access VISA

MANOR SUPPLIES

172 WEST END LANE, LONDON NW6 1SD
CALLERS WELCOME AT SHOP
Mon-Fri 9.30-6pm – Thurs 9.30-1pm – Sat 9.30-5pm

MANY OTHER ITEMS AVAILABLE

The Pace PRD800 Satellite Receiver

J. LeJeune

Over the years many TV receiver chassis have been described in these pages. We have not to date undertaken a similar exercise with a satellite receiver. The one selected as an introduction to satellite receiver technology is the Pace PRD800, an integrated receiver-decoder with true Wegener Panda-1 sound processing, 120-programme capability, three scart sockets, a tunable u.h.f. modulator, full satellite radio coverage, parental lock, a four-event 14-day VCR timer and remote control with a sophisticated menu-led system. It has been included in the ranges of several well-known setmakers. For the purposes of this article we examined a Ferguson SRD5.

The complete circuit diagram is quite daunting at first sight, so the general overview shown in Fig. 1 may help you to get a grip on things. Pace use the letter U for their i.c. circuit reference numbers and, in common with many other manufacturers, Q for transistors. Where to start? What better place than the usual one, the power supply circuit.

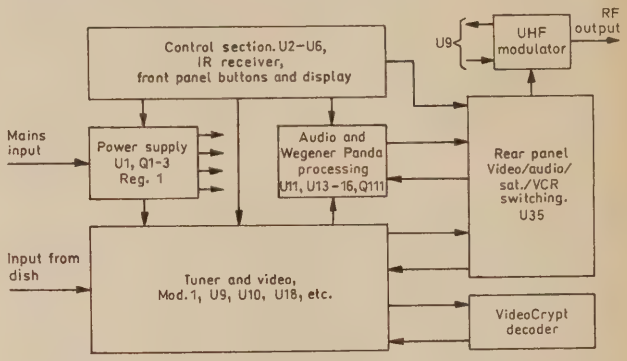


Fig. 1: Simple overview of the Pace PRD800 satellite receiver.

Chopper Power Supply

The power supply circuit is shown in Fig. 2. It's a conventional chopper arrangement that operates at about 26kHz and provides mains isolation. This is an important point with satellite receivers because of possible access to the outdoor unit and the desirability of having a direct video feed to the main TV set via a scart lead. The circuit operates with a.c. inputs over the range 198-264V, the receiver's maximum power consumption being 35W.

T1 and C1 form a filter to prevent hash from the power supply being fed back into the mains. Diodes D1-4 form the usual bridge rectifier, charging the reservoir capacitor C2 to approximately 330V. R1 provides switch-on surge limiting. This mains rectified supply provides a feed for the chopper transformer T2's primary winding (pins 7-13) and a start-up feed via R2.

At switch on R2 charges C6 to establish a supply for the TEA2018 chopper control chip U1. This is fed to pin 6. As the voltage at pin 6 rises, U1 begins to supply drive pulses to

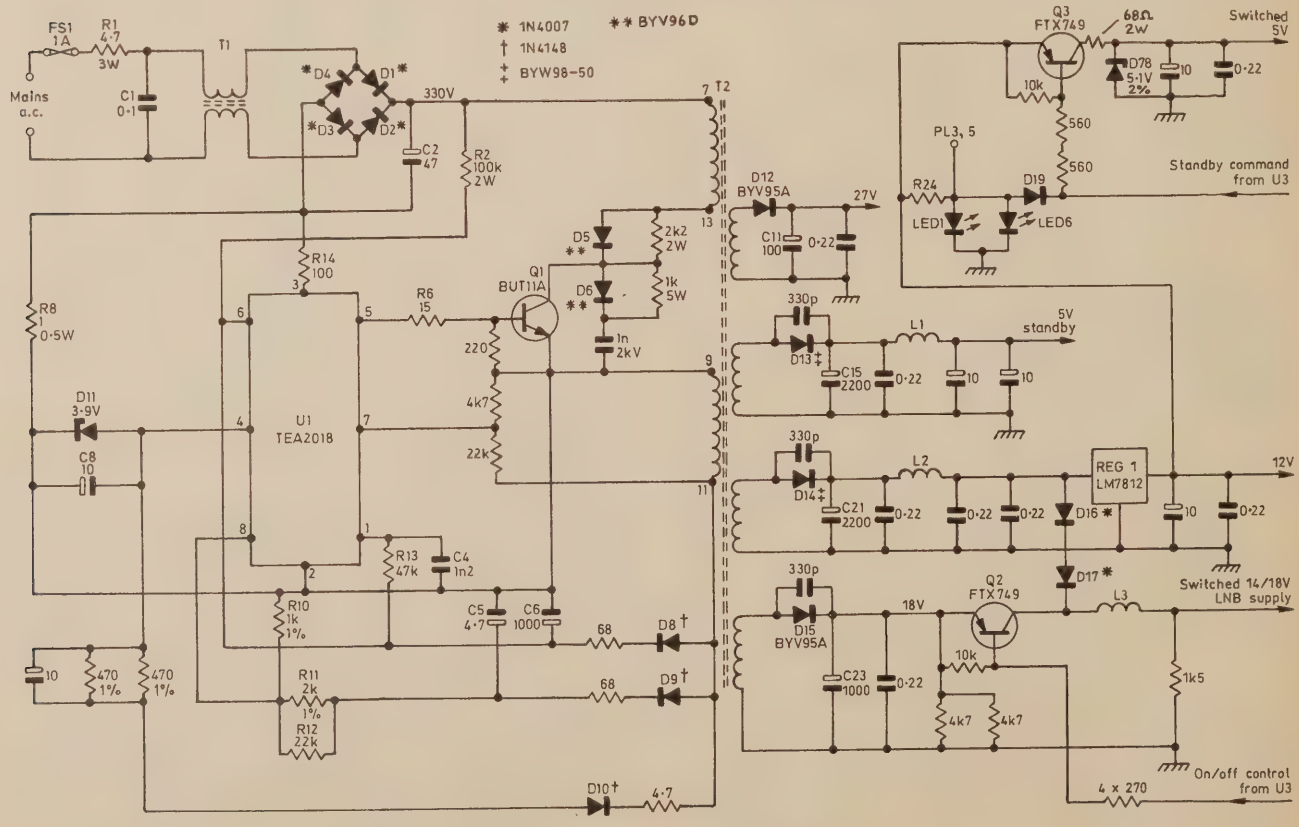


Fig. 2: The chopper power supply circuit.

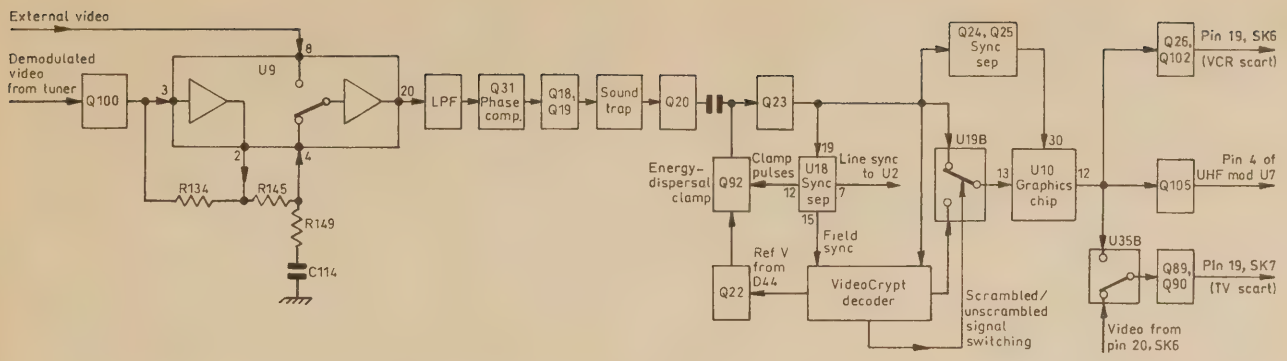


Fig. 3: Block diagram showing the post-demodulator video signal path.

the base of the BUT11A chopper transistor Q1. The capacitance value of C6 is sufficient to provide U1's current demand until the chopper circuit gets going, when D8 comes into operation to maintain the supply across C6 by rectifying the output from winding 9-11 on the transformer. The values of R13 and C4 determine the supply's basic operating frequency.

Two other rectifiers are connected to pin 11 of the transformer. D9 charges C5 which supplies pin 8 of U1 via the potential divider network R10/11/12. This is the voltage sensing pin for supply regulation. When the supply is running normally at full power the voltage at pin 8 is approximately 2·4V.

The chopper transistor Q1 is very effectively switched off by the negative voltage generated by D10 and C8, regulated by the 3·9V zener diode D11. This voltage is fed to pin 4 of the chip. Q1's base is driven from pin 5 via R6.

The low-value (1Ω) resistor R8 connected in series with Q1 generates a voltage proportional to Q1's current. This is fed via R14 to pin 3 of the chip to provide current limiting. The operating principle of this circuit is similar to that of a beam-current limiter. In the event of excess current flowing via R8, Q1 and the primary winding of T2, the rising negative voltage at pin 3 of U1 reduces the mark-space ratio of Q1's drive waveform so that Q1 conducts for a shorter time during each on/off cycle.

There are four rectifiers on the secondary side of the circuit, D12-D15. D13 produces a standby 5V supply across C15. D14 and C21 provide an input for the 12V regulator REG1. Q3 provides a switched 5V supply for the modulator. In the standby mode pin 15 of U3 in the control circuit goes high. This voltage is connected to the base of Q3 which, being a pnp device, switches off. As D19 is also switched off the supply to LED1 and LED6 is no longer shorted out and these diodes light to give the standby indication – note that the indicator circuit is present in some models and not others, including the PRD800. During full-power operation, when Q3 is conductive, zener diode D78 stabilises its collector voltage at 5V.

The 14/18V switched supply for the LNB comes via either D16/17 or Q2 depending on whether Q2 is switched on or off. Q2 is controlled by pin 16 of U3. When Q2 is switched on the LNB receives 18V from the rectifier circuit D15/C23, D16/17 then being biased off.

There are no adjustments, the operation of the circuit being preset by R10/11/12.

Control Circuit

The heart of the control circuit is the microcomputer chip U2 which is a Z8 family device. It runs at a clock frequency of 4MHz, controlled by crystal X1. There are four other chips in this section of the circuit. U3 and U4 are buffers that limit the current drain on U2, U5 is a multiplexer for the front-panel character display while U6 is an EEPROM which stores the information set by the on-screen menus. There are also two transistors, Q96 and Q98, that act as inverters. Pin 6 is U2's reset pin, D20 and C31 giving the reset action. C31 is rapidly discharged by D20 at switch-off, charging slowly at power-up so that pin 6 is held low for a few milliseconds to reset U2.

Video Path

Frequency-synthesis tuning is used. The detected video passes from the tuner-demodulator block via the emitter-follower buffer transistor Q100 to pin 3 of U9, see Fig. 3. A video preamplifier within this chip raises the signal level, the amplified output emerging at pin 2. Video gain is set by the feedback resistor R134 while R145, R149 and C114 provide de-emphasis. The signal returns to U9 at pin 4, after which an internal switch selects either external or internal video. Further amplification is then provided, the video signal finally leaving U9 at pin 20. The following low-pass filter (L10/11, C103/4/5/6) has a 5·5MHz cut-off frequency. Correction for the group-delay effects (phase shift varying with frequency) introduced by this filter is provided by the circuitry around Q31. The circuitry associated with Q18/19 filters out the sound subcarriers.

Up to this point the video signal still has imposed on it the triangular 'energy-dispersal' signal that's added before transmission to prevent interference with other microwave services. If the 25Hz energy-dispersal waveform was not removed the picture would suffer from intolerable flicker – and VideoCrypt decoding would be impossible. Very tight video signal clamping to a stable d.c. level is carried out, line-by-line, by field-effect transistor Q92 in Q23's base circuit – Q23 is an emitter-follower buffer transistor. Fig. 4 illustrates the action of this clamp.

Clamping is done at the start of every line, during the back porch that carries the colour burst. A pulse from pin 12 of U18 switches Q92 on, setting Q23's base voltage at a d.c. level which is determined by D44 and Q22 – D44 is a 2·4V zener diode that's within the VideoCrypt decoder. The f.e.t. Q92 has a low on and a very high off resistance, so that once Q23's base voltage has been set Q92 will not leak away the clamp charge on the video coupling capacitors C132/C313. This circuit provides the accurate clamping required for the VideoCrypt decoder to produce noise-free, unscrambled pictures.

After clamping the video signal goes four ways. One path is to pin 19 of U18, which provides the gating pulses for the energy-dispersal clamp at pin 12, field sync pulses for the VideoCrypt decoder at pin 15, and at pin 7 line sync pulses for pin 39 of U2 which uses them to identify the presence of a station for muting purposes. A second feed goes to Q24/5 which form a sync separator circuit that feeds composite sync

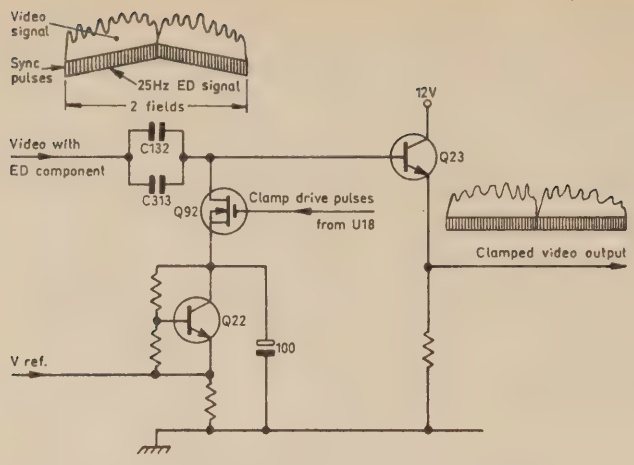


Fig. 4: Action of the clamp that removes the 25Hz energy-dispersal signal.

to pin 30 of U10, the graphics generator. The third and fourth feeds both end up at the switch in U19B, one feed going there directly while the other one goes via the VideoCrypt decoder. The output from U19B goes to pin 13 of the graphics generator chip U10 where the colour graphics are inserted into the picture or replace it. U10's output, at pin 12, is fed to pin 19 of the VCR scart socket SK6 via Q26 and Q103, to pin 4 of the modulator chip U7 via Q105, and to switch element U35B: this feed ends up, via Q90 and Q89, at pin 19 of the TV scart socket SK7.

The Modulator

The modulator module includes the r.f. bypass circuit for off-air signals passing through the receiver and the r.f. combiner circuit which adds the modulator's output to the off-air spectrum. A two-stage, broad-band circuit with a gain of about 3dB amplifies the off-air signals: this low gain is provided simply to compensate for the losses incurred in the combining process.

The modulator itself is within U7. Fig. 5 shows a block diagram of this chip and the tuning system. Varicap diode D21 and its associated components tune the video carrier oscillator. D21's cathode is biased by a 0-24V supply from pin 14 of U9 via Q9/Q97. Prescaler U8 takes an output from video carrier oscillator, producing a divided-down output in the range 7-14MHz. This is fed to the phase-locked loop

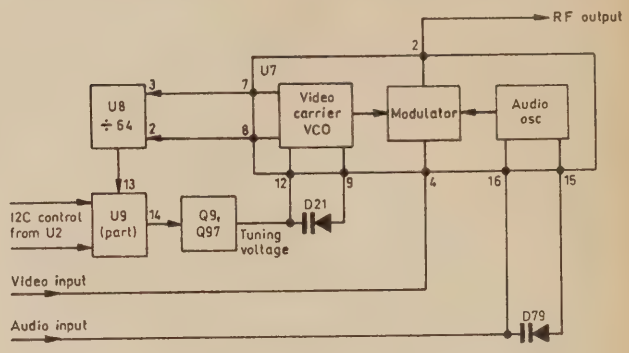


Fig. 5: Block diagram of the u.h.f. modulator and its tuning system.

tuning system in U9. The 4MHz clock signal from pin 29 of the microcomputer chip U2 provides the reference for the PLL system. Control of the PLL in U9 is from U2 via the I2C bus. The audio section is tuned and frequency modulated by varicap diode D79 and its associated components.

Colour Graphics

The colour graphics chip U10 is controlled by the microcomputer chip U2 via the I2C bus. Fig. 6 shows the circuitry in this area. The 17·734MHz crystal X2 is resonant at four times the colour subcarrier frequency. It uses a PLL to lock to the received colour burst. L12, C119 and C120 tune the character generator readout clock oscillator.

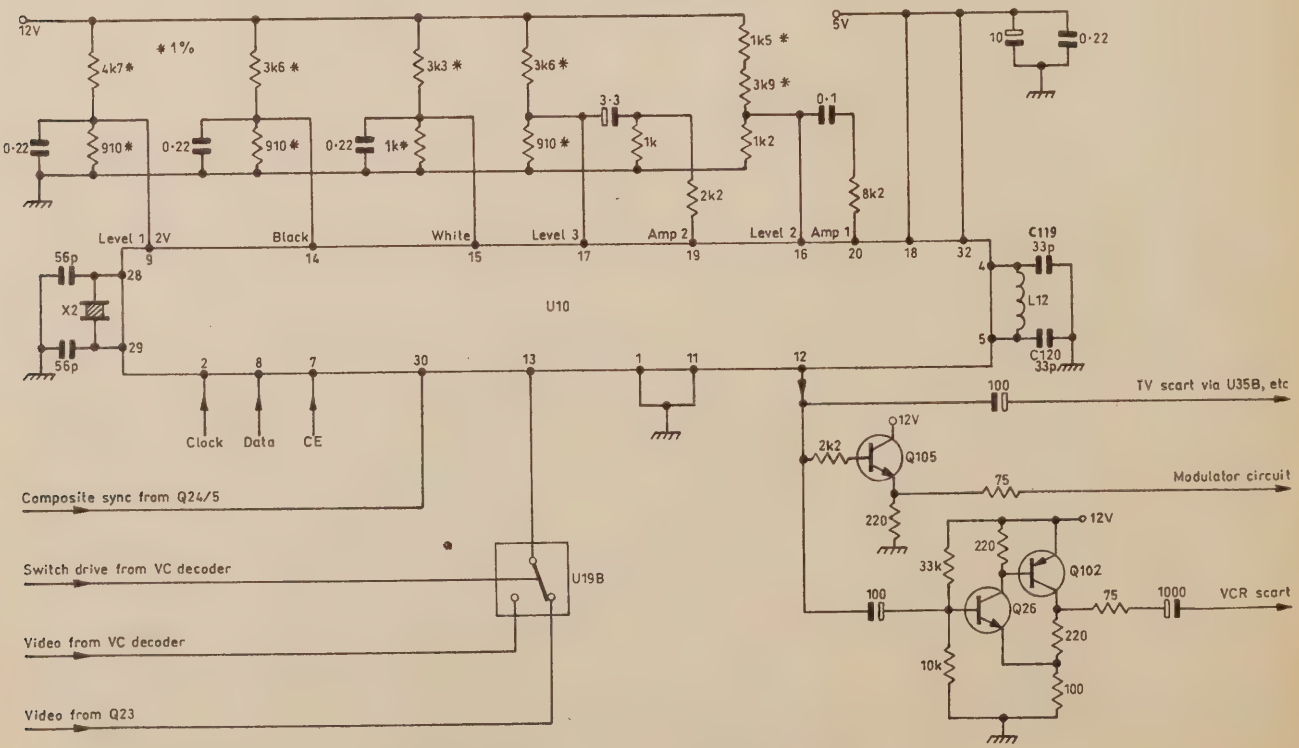


Fig. 6: The colour graphics chip circuitry.

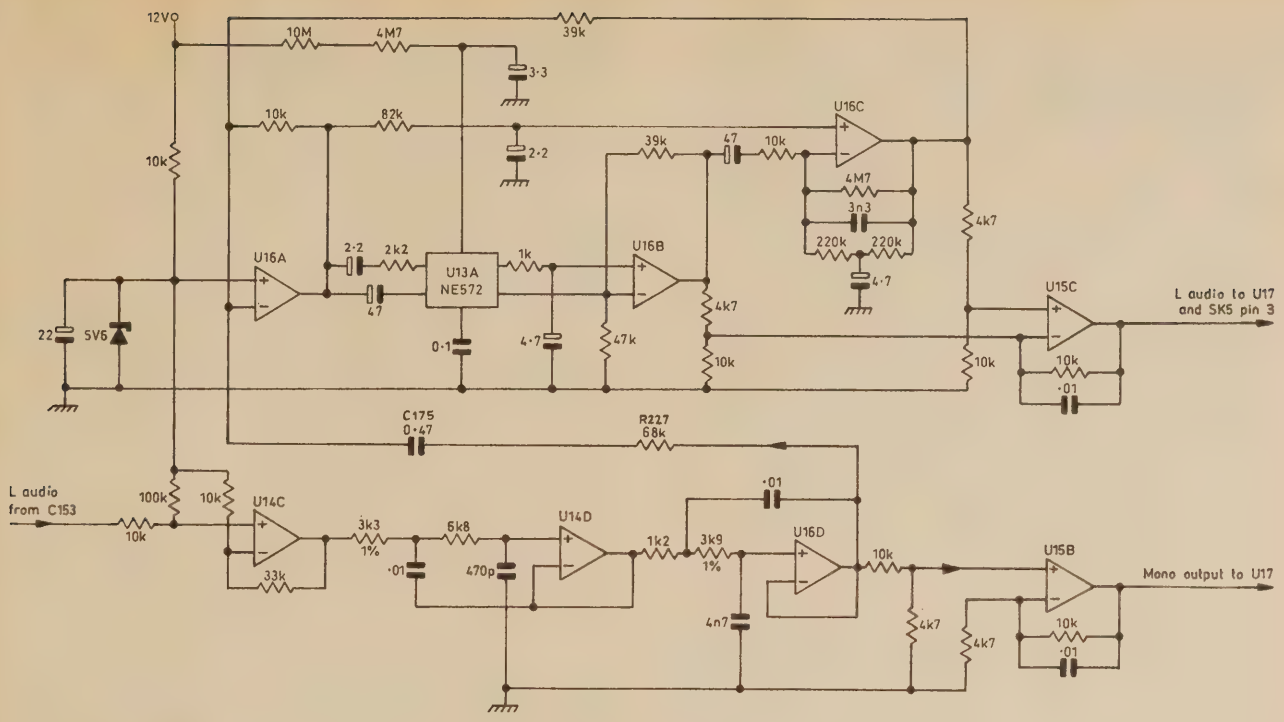


Fig. 7: The left-hand audio channel signal-processing circuitry.

The presence of scrambled video is detected by the decoder which produces an output to control the video source select switch U19B. When a clear transmission is detected this switch passes the direct video feed from Q23 to pin 13 of U10. When there is no video signal U2 detects the absence of line sync pulses and tells U10 to insert a blue background for the white characters. The video/graphics output at pin 12 is passed to the modulator via emitter-follower Q105. There are also feeds to the TV and VCR scart sockets as shown.

The sync tip, signal black and peak white levels and other parameters for the graphics are set by the networks connected to pins 9, 14, 15, 16, 17, 19 and 20 of U10.

VideoCrypt

Because of the confidential nature of VideoCrypt decoding the circuitry used is not divulged.

Audio

The demodulator's output contains a spectrum of signals from 50Hz to nearly 8MHz. Video occupies the spectrum up to 5·5MHz, the audio subcarriers beginning at 6·5MHz. They are frequency modulated and consist of single mono carriers and pairs of stereo carriers grouped in the standard way: the main mono subcarrier is at 6·5MHz, the first stereo pair at 7·02MHz and 7·20MHz and the second pair at 7·38MHz and 7·56MHz.

U11 performs audio selection by up-conversion of the audio subcarriers to 10·52MHz and 10·70MHz. The switching is controlled by software, the left-hand channel only being selected for mono operation. U11 also carries out limiting and demodulation.

Many satellite broadcasters use Wegener Panda stereo. This is catered for by a Dolby-like expander and sliding high-pass filter, the latter depending on the audio signal's h.f. content. In addition a noise-cancelling system which uses filtering and inversion improves the signal-to-noise ratio before signal de-emphasis. This filters off the noise, inverts it and adds it to the unfiltered audio to cancel the noise content – a similar process is used in VCRs. Fig. 7 shows the left-hand audio processing circuitry.

U14C, U14D and U16D provide a 24dB per octave roll-off above 15kHz. The mono signal is taken from U16D and passed via U15B to the audio switching circuits. The left-hand stereo signal goes via R227 and C175 to U16A which has a gain of around 17dB. U13A contains a variable-gain amplifier which is controlled by bias from an internal rectifier circuit: the larger the output from the rectifier, the greater the amplifier's gain. This brings about the volume range expansion. U16C is an active variable low-pass filter that's driven by U16B. U15C receives the filtered and full-bandwidth signals, cancelling the noise and carrying out audio de-emphasis.

In Conclusion

This concludes our look at some of the circuitry used in the Pace PRD800 and its clones. We've found that the unit is very reliable in operation, with few problems. Possibly the biggest problem was radiation that affected low-end u.h.f. channels up to about Channel 42: later production units are markedly better in this respect and we can get around the few problems we do encounter by using high-quality r.f. leads and carefully positioning the unit. Replacement lead sets for use with earlier receivers are available to bona fide dealers/service companies free of charge from Pace Micro Technology Ltd., Victoria Road, Shipley, W. Yorkshire BD18 3LF (0274 532 000, fax 0274 532 010). Blown chopper transistors were apparently a problem with early models, and because of this the value of R8 was changed from 0·75Ω to 1Ω, but we've never experienced any failures in this part of the receiver. Because the coaxial connectors for the terrestrial TV aerial and the r.f. output lead are soldered directly to the PCB you may encounter dry-joints should frequent disconnections and reconnections be made. The electronic failures we've encountered have been too few to mention. In fact it's an excellent unit all round.

For a short review of the PRD800, see the December 1992 issue of *Television*.

What a Life!

Donald Bullock

Les Lawry-Johns' death was a great loss to us all. In a practical sense he was a technical wizard of his time. But the reason for his great popularity amongst readers – I suspect that most long-term readers turned to his article first when the latest magazine arrived – went deeper than this. He was one of us, a fellow sufferer at the hands of Joe Public. We knew those who caused him such trouble: thinly disguised, they circulate amongst us all. Like the rest of us, Les knew exactly what they were up to. Yet he continued to suffer because his tormentors – our tormentors – have no code of honour. Like us all he constantly resolved to harden, to make the most of his experience so that he would come off best in future. But he seldom did, and nor do we. It isn't in our stars. We're born losers.

Les's troubles were ours. But he was a bit more honest, a bit more vulnerable and a great deal more decent than most of us. His writing left us all richer. I, for one, am grateful to him.

Grundig Troubles

Kevin Bentun brought his Grundig colour set in the other day – a CUC2401 type. "It's gone mental" he announced. "All right at first, then the sound and picture fade, leaving the screen bright. After a while the picture comes back and flutters at me. Enough to get a chap's dander up, I can tell you." And off he minced.

Hoping to resolder a few dry-joints and make some quick money I got cracking. There would, I figured, probably be a line output transformer derived supply playing up. An hour later I'd got nowhere, so I decided to stop and try to think about it. Well, it could be the line output transformer. We had one like it in stock, so I fitted it. This made no difference. I next connected a voltmeter to the tuner's 12V supply. When the fault returned, the voltage swung about. On opening the tuner I saw several suspect joints, but resoldering them didn't help. As the supply remained stable when it was connected to a dummy load I carried out a more detailed examination of the tuner and soon found a 220µF, 10V electrolytic that had dried up. A replacement cured the trouble.

Then, surprise, surprise, Mr. Fussie fidgeted in with another Grundig set that was just the same.

"It's never been right since you mended our wireless" he bickered. "I took it to Snoddies and they fitted some parts and charged me £40, but it's still the same."

"Why don't you take it back to them?"

"They recommended you."

As the fault was identical to the pervious one I mended it in no time. He returned shortly after I'd phoned him with the news.

"What was it?" he moaned, looking at me as though I was a bad drain.

"A condenser" I said. "Twenty five pounds."

"How much was the part?" he asked.

"Tuppence" I replied.

"That's sixty five pounds in all" he whined, "Snoddies said you might be expensive. Can you guarantee that another part won't go? Could this have damaged anything else in the house?"

I gave him a deranged look and he departed, leaving me wondering why, all those years ago, my people put me in this trade when the local paper beckoned me. The extra pound a week I suppose. Oh to start again!

Video Problems

Mrs. Tubby rolled in from the Forest of Dean with something in a plastic bin liner. "How much to mend this?" she asked, eyeing me as though I was a sneak thief.

"What is it?" I asked.

"Wonky" she said.

After a delay she extracted the item from its bag. It was a Philips/Pye DV286 VCR that was matted with greasy dust and had strands of tape hanging from its mouth.

"Help" I muttered as I waved her out. Then I called Steven in from the van. "Your job" I said.

"What's up with it?" he asked.

"Wonky" I replied. He gave me an odd look and took it over to his bench.

Having unloaded that one I pulled a Ferguson 3V47 portable VCR on to the bench. "Picture was intermittent, now gone. Sound o.k." said the card. The machine was full of dust and tape debris. So I gave it a thorough service and tried it again. It was no better. I took the video heads out and found that the leads hadn't taken to the solder when the machine was produced. They were held only by the resin. After resoldering them I tried the machine again. The results were excellent. As I was boxing it up I looked over at Steven. He'd finished the Philips video and was doing the bill.

"What was it?" I asked.

"A jammed Chinese cassette and a missing spring which should have held the back-tension arm by the tail. I found it in the works. It's o.k. now. What shall I charge?"

"Up to you" I said. "But you won't win. If you charge enough you'll be a rogue. If you make a small charge it was easy and you shouldn't have charged anything at all. And God help you if it goes wrong again or another of her Happy Friend tapes jams. And don't phone her yet, because that will mean that there couldn't have been anything much wrong with it."

"I wouldn't mind a cup of tea" said Steven. I got the message. Never mind. Who sits on pride after a forty year battering?

Miscellaneous Faults

As I set about making the tea Steven pulled a Panasonic TX5500 (U5 chassis) on to the bench. The card said "no brightness". He stood there pondering.

"IC601" I said.

"You see what?" he asked.

"It won't be a no brightness fault" I said. "Almost certainly it'll be no luminance because the TDA3562A chip IC601 on the upright panel to the right of the main chassis has failed. Don't forget the A" I added as he looked in the i.c. drawer. "You'll get nowhere if you fit one that doesn't have the A suffix."

So that's what he fitted, curing the trouble.

Then he pulled a Neff 6007 microwave oven on to his bench. When he operated it the counter worked but the rest didn't.

"What do you think's up with this?" he asked.

"Dunno" I said, "and when you find out, shield me from the answer."

A short while later he had it working. The switch at the top of the door had burnt out. Whilst at it he replaced them all.

As I was washing up he got busy with an Hitachi VT8300 that wouldn't accept a tape. It didn't take him long

to discover that the loading motor wasn't working. "There's 6V on the pink supply lead" he said "and only 0·4V on the white. I'll check around IC905 and 906."

"Check R081 while you're doing that" I said. It was open-circuit, a replacement restoring normal operation.

Visitors

Just then the door flew open and an RAF chappie from the nearby estate breezed in. He was carrying a cardboard box that contained a dismantled television set.

"Ah!" he said. "They tell me you're good with a screwdriver! I got this set for nothing in Germany. When I brought it back the sound needed twiddling. So I had a go and swapped some of those things with legs. Some smoke came out of there, where it's gone black. I don't mind letting you do it, but I don't want to spend. . ."

I opened the door and jerked my head. Off he went. I felt the need for some air and wandered out to have a word with Brian who does a bit of gardening for us. He always looks well and smart and as usual had a cigar wedged in his mouth. He was clipping at some bushes. A van spluttered up and out leapt this all-in wrestler with a Ferguson 3V00 video, also dismantled.

"Where's Mr. Bullock, mate?" he asked me thickly. Then he saw Brian and shot over to him.

"Ah Mr. Bullock. This thing's got a volt gone wrong. It isn't much and won't take long. Don't wanna spend much, see. . ."

I sauntered off and Steven appeared. Later I came in at the back of the workshop and found him putting it together. "What do you think of this trade?" I asked him.

"It's good fun" he replied.

That's what I used to think. What's gone wrong with me?

Test Case 374

In the early Eighties the Ferguson TX range of TV sets was all the rage: Sage still has a TX tie that was presented to him by a sales rep. or a TLO in those far-off days. It's a tribute to the design of these sets that many of them are still going strong. One, now well into its second decade of operation, found its way on to Dylan's bench the other day. It was a TX9 of the later sort, with a chopper power supply and PC1044 main panel.

The complaint was about 'green faces'. Sure enough Anne Diamond, who was on at the time, looked as though she had just crossed the North Sea in a force ten gale. Everyone else on the show had the same bilious look. This meant a lack of red in the set's display. As a check the output from a colour-bar generator was fed to the set. The red bar was very muted, and some of the other colours looked a bit strange: blue and green were bright and clear however, despite the fact that the tube was probably a bit tired.

Dylan thought that the tube was likely to be responsible for the lack of red in the display. Out came the wonderful tube tester and, after some rooting about in the box, a base to match the tube. On test the emission of all three guns was found to be a little low, but the red gun was the second best one. All three were brought up to scratch by using the tester/reactivator's 'clean-and balance' facility. When the set was tested the picture was a degree brighter but the low-red fault remained the same. A reasonable monochrome picture was present with the colour control turned to minimum but, as TV Ted said, red is the colour you miss least with a monochrome display.

Dylan switched on his scope and pulled his multimeter across the bench. The first check he made was at the tube's red cathode, where the voltage was rather higher than the 125V specified in the manual. He felt the red output transistor's collector load resistor R132 and found that it was cooler than those in the blue and green output stages. Dylan decided to check the resistor's value, which was correct at 12kΩ, so he went on to twiddle the red gain and background controls RV136 and RV138. The red in the colour-bar display changed a bit as these controls were wound from one end to the other, but at no point was it correct. Dylan began to suspect the BF460 red output transistor itself, TR56. As a check he swapped it over with the corresponding transistor in the blue channel, TR55. This made no difference at all, the transplanted transistor working perfectly well in its new position.

A scope check on the red output signal at pin 12 of the TDA3560 colour decoder chip IC52 was then carried out. For comparison purposes the green and blue output signals at pins 14 and 16 were also looked at. There was certainly something wrong with the red output: its amplitude was low, and the d.c. level was below the specified 3·8V. Could something external to the chip be loading down the red output? R113 and R107 in the feed to TR56 were checked and found to be o.k., as were all the components in the transistor's emitter circuit including the frequency-selective decoupler C95. What else was there to suspect other than the chip itself?

Dylan trotted off to the component store and came back with a pristine TDA3560. When he'd finished installing it he had no doubt in his mind that he'd cured the fault: the diagnosis had been thorough, and every other possible culprit had been eliminated, hadn't it? With a flourish he flung the old chip in the bin and switched the set on. There was Father Christmas on the screen, in a pale, luminous green coat. The fault was still there! Dylan hastily retrieved the TDA3560 chip, which was still warm, from the bin. If you can't work out what was the cause of the fault, turn to page 281.

BACK COPIES

We have available a limited stock of the following back issues of *Television*:

1992 February, April, May, July, August, September, October, November and December

1993 All issues currently available

1994 January

Copies are available at £2·75 each including postage. Send orders to:

Reed Business Publishing,
Television Back Issues,
Room L323,
Quadrant House,
The Quadrant,
Sutton,
Surrey SM2 5AS.

Make cheques/postal orders payable to Reed Business Publishing Ltd.

Dolby Surround Sound

Ian Martin

Several TV models equipped with Dolby Surround sound have been introduced during the last couple of years. This feature had previously been available only with professional cinema and audio products, such as the Pioneer AV amplifier reviewed in the August 1991 issue of *Television*. Widescreen video releases, Laserdiscs and large-screen TV sets have all stimulated interest in 'home cinema'. Toshiba and Hitachi at present have models with Dolby Surround and the more sophisticated Dolby Pro Logic Surround sound: other setmakers will doubtless follow

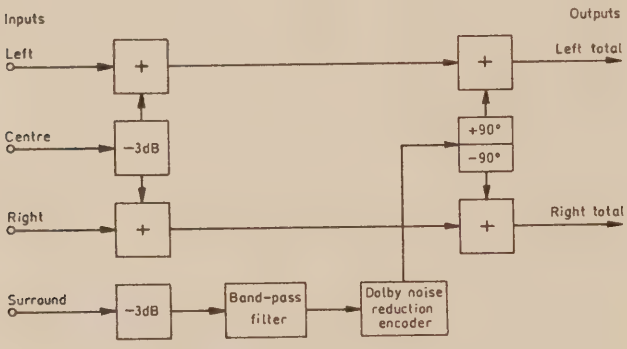


Fig. 1: Dolby Stereo Surround sound encoder block diagram.

suit. In addition Pace has a satellite receiver with VideoCrypt and Pro Logic decoders, aimed at the subscription movie channel market. And why not? What better way for viewers to get maximum value for money from their premium movie subscriptions?

It's not only consumer awareness that has led to the sale of the almost nine million Dolby Surround sound systems now in use worldwide (Dolby's figures). Advancing chip technology has also played a part. Just two years ago a simple passive decoder such as that used in the Toshiba Models 2505DB and 2805DB needed several different chips for signal processing, noise reduction, memory and the control logic. Because active Pro Logic decoders require even more sophisticated electronics, their introduction in cost-efficient TV designs was held back pending the arrival of custom Dolby chips. Such devices are now available from several manufacturers, including Analogue Devices and Mitsubishi.

The situation has changed again over the past year or so as Digital Sound Processor chips (DSPs) have become more widely available. Initially they offered only acoustic and pre-programmed effects, but it was only a matter of time before a Dolby Pro Logic algorithm was incorporated and approved. Such devices, licensed by Dolby, are now available from Motorola and Yamaha amongst others. They can be easier and cheaper to produce than a bipolar ASIC (application specific integrated circuit) chip, as the Dolby processing is controlled by a program that's within the device.

Before we consider a typical decoder design we'll outline how the surround system works.

Dolby Stereo

The system stems from cinema requirements. In a cinema, traditional stereo sound is effective only for viewers sitting near the centre axis of the screen. For those seated off axis the output from one loudspeaker or the other will predominate, giving an unbalanced stereo image. The stereo sound 'sweet spot', i.e. the area in which a realistic, balanced effect is obtained, is in fact quite small. It was found that if a centre channel was added, primarily for dialogue, driving a loudspeaker mounted behind the screen speech was effectively fixed within the picture. This gave acceptable results even for viewers sat near the edges of the theatre. In other words the 'sweet spot' became much larger. The addition of a rear surround channel boosted the effect further by giving the sound a three-dimensional quality. Several surround speakers could be used for this purpose.

Although some film formats enable four or more sound channels to be used, for 35mm films with optical stereo-sound tracks it was necessary to devise a system that encoded four channels as two. The system that came into use was called Dolby Stereo. Fig. 1 shows a block diagram of the encoder. The left and right sound channel signals pass straight through, the centre and surround channel signals being added to them, the latter as phase-shifted signals. As the left and right channels produce the

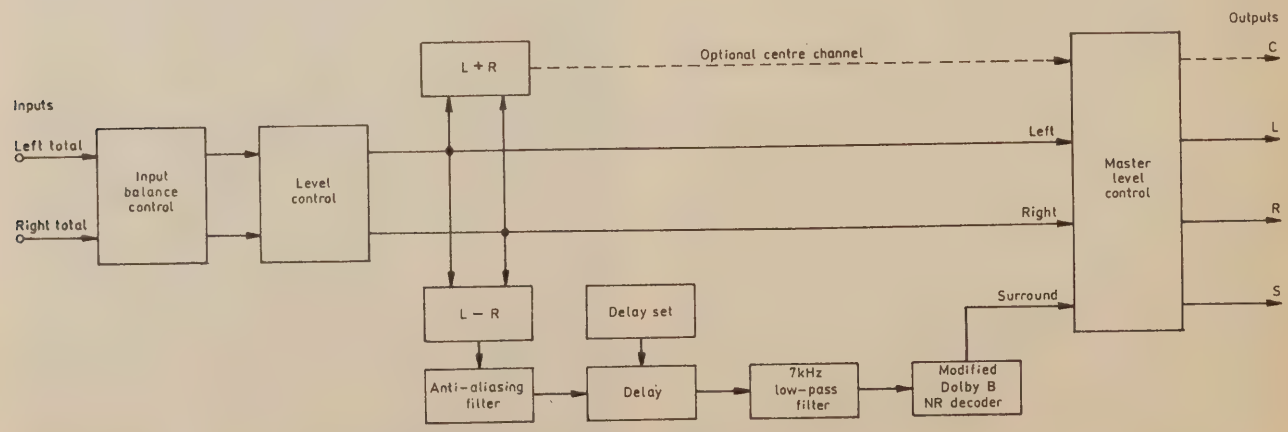


Fig. 2: Passive Surround sound decoder block diagram.

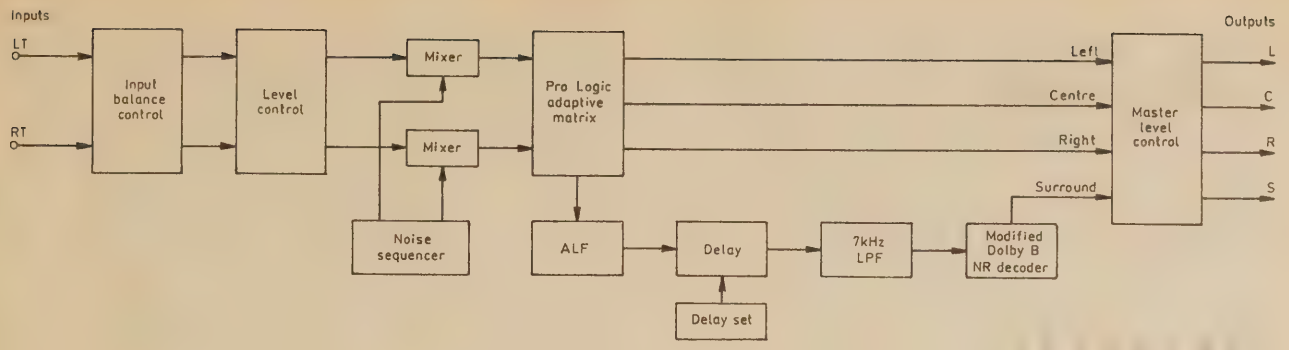


Fig. 3: Pro Logic decoder block diagram.

left total and right total outputs there's no reduction in the basic stereo channel separation.

Dolby Surround

In the decoder, see Fig. 2, the centre and surround channels are recovered by addition and subtraction. Provided the left total and right total signals remain balanced, crosstalk is kept at a minimum. Because the left total and right total channels also carry the centre channel information, for domestic use the centre channel was considered to be optional – the left and right speakers together create a 'phantom' centre channel. The enlarged 'sweet-spot' effect is reduced, but this is not as significant in the home as in an auditorium. This is the system that was used in the first Toshiba Dolby Surround TV models.

To reduce unwanted effects – sibilants could for example be decoded as surround information – filtering is used in the surround channel. For similar reasons a modified Dolby B noise-reduction circuit is used: this reduces hiss, which might otherwise be enhanced. An audio delay is also available. This introduces an artificial lag in the surround channel to give, in accordance with the Hass effect principle, the impression of a larger listening room. Dolby Laboratories recommend various delay times for differently sized rooms. For the average UK living room the delay is in the range 15-25msec.

Because this system uses a simple difference signal to produce the surround channel it's described as a 'passive' surround system.

Dolby Pro Logic

Dolby Pro Logic Surround is a second-generation system that employs additional circuitry to enhance the spatial positioning of sound effects. This is done by continuously monitoring the encoded sound track and evaluating the direction and intensity of dominant sound effects, which are then enhanced in the same direction in proportion to the sound's dominance. To do this a 'signal dominance vector' that tells the decoder in which direction the current effect is positioned has to be generated.

Fig. 3 shows a block diagram of a Pro Logic decoder while Fig. 4 shows some of the elements of the adaptive matrix, which is the heart of Pro Logic processing. The relative intensities of the left, right, centre and surround signals are assessed in the adaptive matrix by first full-wave rectifying them then feeding the outputs to log difference amplifiers which compare these to provide left-right and centre-surround difference signals. Representations of the left-right and centre-surround axes are thus obtained. When a signal appears front left, the left-right and centre-surround difference signals both become positive. A vector is in this way be produced, indicating the sound effect's direction and intensity. When an effect exceeds a certain intensity threshold the decoder switches to 'fast mode', in which polarity splitters convert the two dominance signals to four control voltages, EL, ER, EC and ES, that represent each of the primary directions. These drive four voltage-controlled amplifiers in each of the left and right channels. These eight VCA components and the two left and right components are then weighted and combined in a network. The result is an enhanced effect that remains directionally accurate. As the adaptive matrix contains active operational circuitry, Pro Logic is referred to as an 'active' surround system.

The rest of the Pro Logic decoder is similar to the

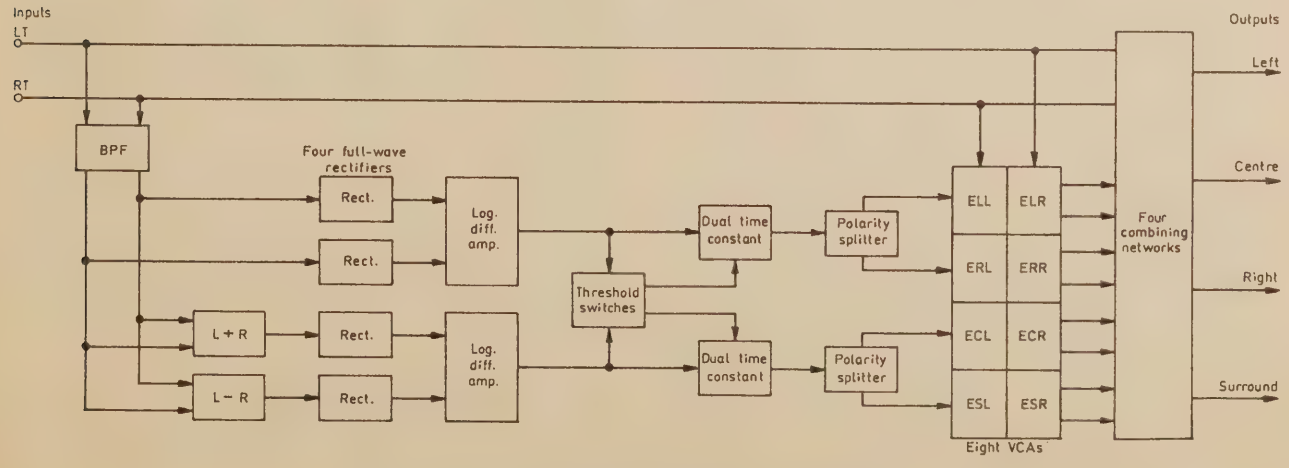


Fig. 4: Pro Logic adaptive matrix block diagram.

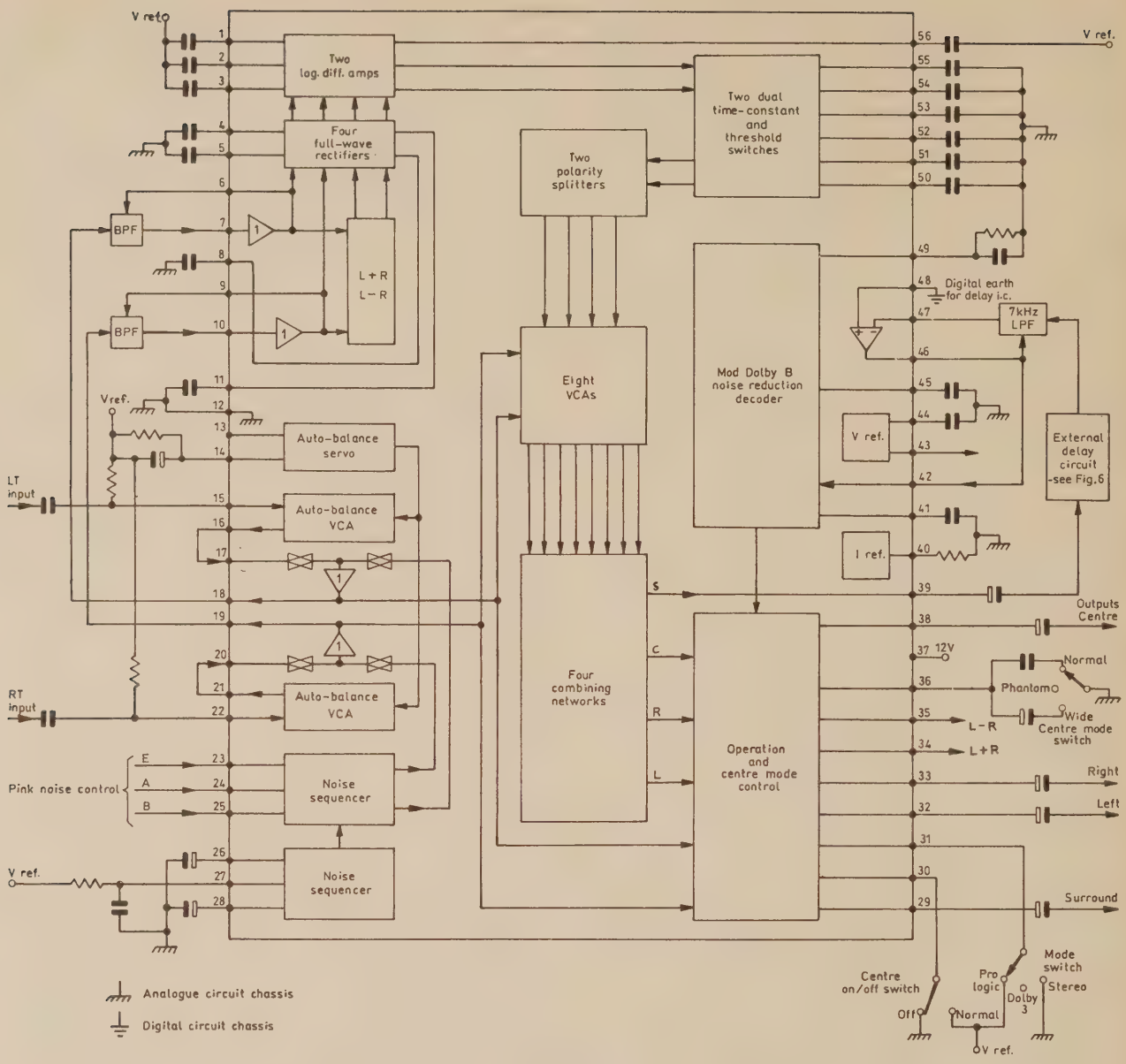


Fig. 5: Operation of the M69032P Dolby Pro Logic Surround processor.

simple passive type except that a noise sequencer is provided. This, when activated, sends pink noise sequentially to each of the channels so that the user can set up his system's balance controls. Pro Logic systems usually have automatic input balance circuits as well.

Centre and Surround Modes

A few options are available when a Dolby Surround sound system is being designed or set up. Most depend on loudspeaker availability.

A 'phantom' centre speaker arrangement was mentioned earlier. Best results will be achieved however if a separate centre speaker is used. As this channel carries mainly speech information, with a limited bandwidth, a low-cost speaker will suffice. Another centre channel mode, called 'wide', is provided for use with a high-quality, full-range centre speaker: this ensures that the high- and low-frequency signals are distributed across the left, right and centre channels.

The positioning of the centre speaker is one of the biggest problems a TV receiver manufacturer faces when Dolby Surround sound is to be incorporated. Though a small, low-cost unit may suffice it will have to be mounted close to the screen, so magnetic shielding or cancellation must be provided. For this reason many models use the 'phantom' centre speaker arrangement, though provision may be made for the customer to connect an external centre speaker.

The Dolby 3 Stereo system is quite popular in North America. This has left, right and centre channel speakers installed in the receiver but no surround speakers. It gives the benefit, in comparison with normal stereo, that speech is always fixed close to the screen. Optional rear channel speakers can be added later and the set switched to surround operation.

A Practical Pro Logic Decoder

Designers of consumer electronics products have the choice previously mentioned: to use either a custom chip (ASIC) or a DSP. Digital sound processors are becoming

cheaper but are most suitable for use where the signals are already in digital form, e.g. from a CD, Laserdisc or a D2-MAC source. In most cases the DSP will also require a microcontroller chip and external memory. Thus as a stand-alone solution the simplest approach, which we'll describe here, is to use a custom chip.

One such device is the Mitsubishi M69032P, a custom Pro Logic decoder chip that, apart from the anti-alias filter and the delay, contains all the circuit blocks required in a single package. A separate CMOS chip that incorporates a 16Kbit static RAM, the Mitsubishi M65830P, provides the filter and delay features.

Figs. 5 and 6 show the system: the blocks can be compared with Figs. 3 and 4. Note that the M69032P provides L + R and L – R as well as L, R, C and S outputs: these are not necessary for the Pro Logic application but may be useful for other purposes. The recommended supply voltage for the M69032P is 12V, the chip generating a 4V reference voltage internally. Depending on function, many of the external components are connected to the reference voltage rather than chassis. In the interests of avoiding digital noise it's important to have separate analogue and digital chassis connections, linking them together at a single point.

The decoder options are set by connecting various control pins to the reference voltage or chassis. For example when pin 31 is connected to chassis the 'ordinary' stereo mode is obtained, when it's connected to the reference voltage the Surround mode is selected while leaving it open-circuit gives the Dolby 3 Stereo mode. Likewise pin 30 selects centre channel on/off while pin 36 selects the normal, phantom or wide centre channel mode.

Left total and right total inputs from a VCR, Nicam decoder etc. are fed to pins 15 and 22 respectively. After automatic balancing they are fed to unity-gain amplifiers where they are mixed with the signals from the noise sequencer (when this is selected). They next pass to the Pro Logic adaptive matrix. Here part of the signal goes to the voltage-controlled amplifier (VCA) and combining network blocks while another part is fed to the bandpass filters. These consist of external filter components and internal unity-gain amplifiers, connected at pins 7 and 10. The rest of the adaptive matrix blocks are all internal.

The left, right and centre outputs from the combining network block go to the operation and centre mode control block before leaving the chip at pins 32, 33 and 38 respectively. The surround sound output from the combining block goes straight to pin 39 for application to an optional delay circuit to which we'll return in a moment. After passing through a 7kHz low-pass filter the surround sound signal re-enters the chip at pin 47, emerging again at pin 46 then returning at pin 42 to go to the modified Dolby B type noise reduction block. After this it passes to the operation and control section, finally leaving the chip at pin 29.

Delay Chip

The M65830P digital delay chip contains an input analogue-to-digital converter (ADC), a memory, delay control and an output digital-to-analogue converter (DAC). There's a serial port for delay adjustment – it's not used in this application. One-bit adaptive delta modulation (ADM) gives simple single-bit encoding. A 2MHz resonator connected to pins 2 and 3 provides the master clock frequency – ADM coding requires a much higher frequency than that of the analogue input signal.

The input to this chip enters at pin 23, with low-pass filtering via pin 22. The signal is then passed to the control block, where analogue-to-digital conversion takes place. Leaving pins 4, 5 and 6 open-circuit and earthing pin 7 sets the delay time. After digital-to-analogue conversion the delayed signal emerges from the control block and returns to the decoder chip via pin 13, with low-pass filtering via pin 14.

If delay is not required pins 39 and 42 of the decoder chip can be connected together, with the digital chip omitted.

With the delay chip included, the number of external components required with the M69032P decoder chip is approximately eighty. Most of these are small capacitors and resistors. Probably the most expensive items are the electrolytic capacitors that provide the coupling for the inputs and outputs.

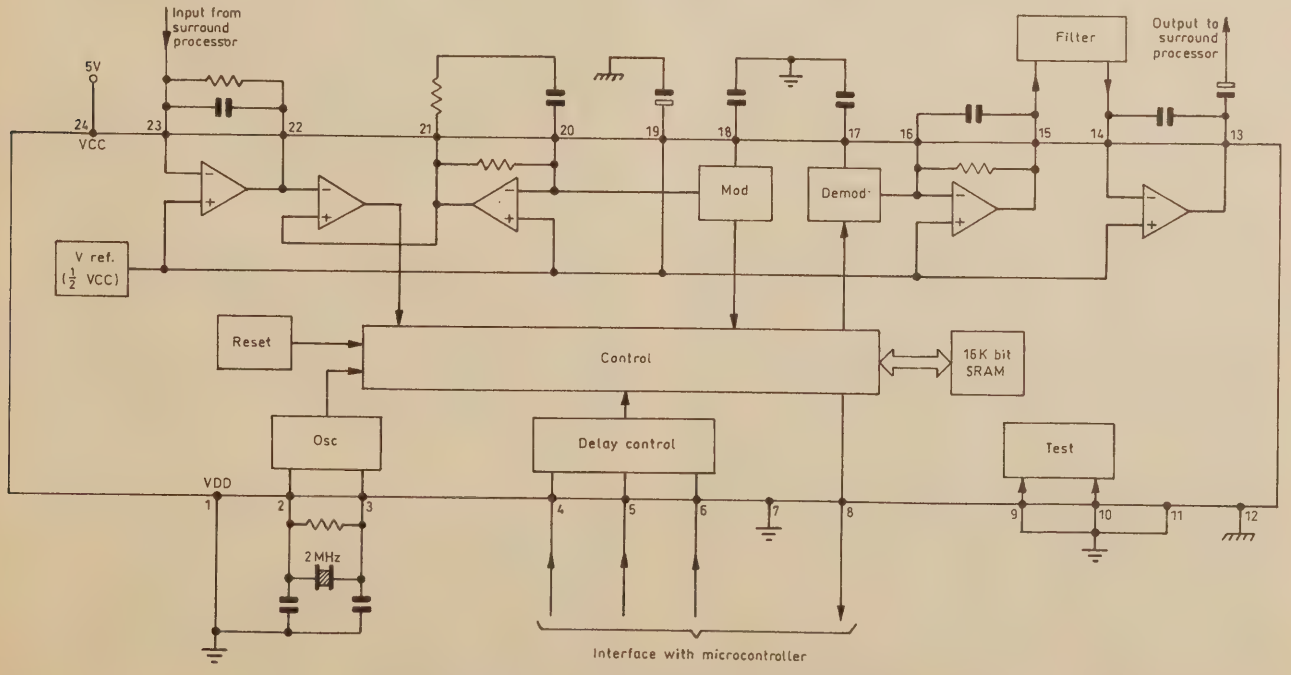


Fig. 6: Operation of the M65830P digital delay chip.

After testing an evaluation board that uses this circuit I must say that it works very well. The solutions offered by other chip makers differ in complexity or circuit configuration, but all must have the same basic functional blocks. This also applies with DSP systems, where the circuit operation is more difficult to see as it's achieved using software.

Surround Licensing

Dolby Laboratories protects its copyright by allowing the technology to be used only by companies that have signed a licence agreement. Even when a licence has been obtained all new products must be approved and their performance checked for adherence to the specifications before they can be marketed bearing the Dolby logo. A fee has to be paid for each use of the copyright mark on the product and, via the supplier, on the relevant components inside. This ensures that only licensed companies with approved designs can obtain the necessary parts. It also means that it is difficult to obtain parts for home construction or experimental purposes.

Acknowledgements

My thanks to Dolby Laboratories Inc., Wooton Bassett and Mitsubishi Electric U.K. Ltd., Hatfield for supplying help and information.

HELP WANTED

Wanted: 250-0-250V, 370-0-370V and 425-0-425V 80-250mA Electrovoice, Osmabet etc. h.t. transformers. May buy batches for cash. M.J. Evans, 7 Shap Drive, Warndon, Worcester WR4 9NY.

Wanted: Four Hitachi 8611A E3AF 14A607C1A chips for a Ford car power amplifier type 86AB-18T805 used with the ECU2 tuner/cassette deck. Geoff Davies, 13 Bowen Road, Rugby CV22 5LF. 0788 574 774.

Wanted: A TDA1104SP and an AN247P chip. L. Mawdsley, One Way TV, 82 Sandhurst Road, Rainhill, Prescot, Merseyside L35 8NQ. 051 426 4152.

Wanted: Aerial/i.f. amplifier in screening cans for a Grundig VS510GB VCR. Ian Burnell, 88 Weaverham Road, Norton, Stockton on Tees, Cleveland TS20 1QL. 0642 554 690.

Wanted: Remote/tuning panel (part no. 3113 108 67260) on which the back-up battery sits for a Philips 20CT4626 TV set (KT4 chassis). Sarah Burton, Circuit Services (Lincs), 31a High Street North, Ruskington, Lincs NG34 9DY. 0526 833 023.

Wanted: TMS3529 chip or programme tuning module part no. 29502-003-21 for the Grundig GSC200 chassis or intact, non-working chassis for parts. H. Ben, 6 Talbot Road, East Ham, London E6 2RZ. 081 471 6348.

Wanted: TDA2653 i.c. for the Grundig Model B7681 (CUC740 chassis). G. Orchard, Orchard's Electrical, Whitstone, Holsworthy, Devon EX22 6TZ. 0288 84 522 or 0836 317 092.

Wanted: TDA2655 (not TDA2655B) for a Saba colour set. Gay Hannon, Moylena, Tullamore, Co. Offaly, Eire. 010 353 506 21407.

Wanted: Decoder and RGB panels for the Philips K35 chassis and the chopper transformer for the Fidelity ZX3000 chassis. J. Levy, 19 Totternhoe Close, Kenton, Harrow, Middx HA3 0HS. 081 907 3620.

Wanted: UE30-B22 tuner for a Goodmans R1400 portable TV set sold by Comet. R. Thomas, Thomas TV Video Repairs, 4 Jolly Road, Garnant, Ammanford, Dyfed SA18 1NE. 0269 823 711.

Wanted: New or used complete front PCB for a Panasonic NVG40 VCR. Also service information for the Toshiba V73DC VCR bought in Hong Kong. K.J. Woolley, 35 Wenthill Close, High Ackworth, Pontefract, W. Yorks. 0977 708 408.

Wanted: Service manual for the Sanyo VTC-NX100 VCR. And can anyone help with a Marconi TF144H/4 standard a.m. signal generator. R. Baker, 17 Chapel Lane, Upwey, Weymouth, Dorset DT3 5NA. 0305 208 815.

Wanted: Operating manual or any other information for the Telequipment DM53A scope. Can anyone date a Bush T76C valve TV set? Thomas McGhee, 86 Haldane Terrace, Dundee DD3 0JF. 0382 810 072.

Wanted: Manual or photocopy of one for the Amstrad TVR3. Bill Pattison, Glenmore TV, 42 John Greekie Road, Durban, 4001, Natal, RSA.

Wanted: Manuals/circuits for the Advance OS1000A and Scopex 4S6 scopes. Nicholas Arnold, Flat 190/31 Griffin Close, Bristol Road South, Northfield, Birmingham B31 2UT.

Wanted: Service manual for the ITT VR3919 VCR. Copy would do. John R. Taylor, 14 Lastigar, Westray, Orkney KW17 2DJ. 085 77 235.

Wanted: Service manuals for the Technicolor/Funai 212E VCR, the Telefunken FK500 video camera (or JVC equivalent) and the Philips VP700 laser disc player. T. Martini, 6 Levant House, Mile End Road, London E1 4RB. 071 790 6807.

Wanted: Service manual (loan or photocopy) for the JVC GXN5E video camera. Geoff Darby, 69 Churchill Road, Earls Barton, Northampton. 0604 811 438 (evenings).

Wanted: Philips laser disc players, working or not, condition not important but must have working laser. R. Lewis, 59 Lawfield Avenue, West Kilbride, Ayrshire KA23 9DH. 0294 823 550.

Wanted: Working main PCB for the Sony KVM2121U. Barry Tuttiett, 28 Queen Street, Barwell, Leicester LE9 8EA. 0455 851 599.

Wanted: Secam/PAL transcoder, preferrably in-line type, modulator not required. R. Lawrence, 31 Goldstone Road, Hove BN3 3RN.

See also page 267.

Screen Entertainment 2000

George Cole

What will television be like in the next century? At the end of October around 300 delegates gathered in London at the Screen Entertainment 2000 conference to hear the views of people involved in the electronics, consumer, broadcast and telecommunications industries. The common theme was 'convergence', the way in which these various industries are forming closer links with one another: the factor that's bringing them together is digital electronic technology.

Multimedia

Part of the first day was devoted to consumer multimedia systems. Philips' director of interactive media systems John Hawkins announced that some 100,000 CDi decks have now been sold world wide. The figure was expected to double by the end of the year and sales of a million decks were forecast by the end of 1994. CDi should be available at over 13,000 retail outlets by the end of 1993. Over 850 companies are now involved in CDi development, publishing, studio production and hardware manufacture. More than a hundred titles are now available and a further 250 are in the course of production.

Philips sees the new Video CD standard as a boost to CDi. At the recent Japan Electronics Show nine companies showed dedicated Video CD players: three Korean companies have also demonstrated machines. The digital video upgrade cartridge that enables a base type CDi deck to play full-motion video titles costs £150 and has been released in the USA, the UK, Japan, France and the Benelux countries. It will be available throughout Europe in 1994. Ten studios around the world are encoding digital video, and real-time encoders are expected to be in use in early 1994. When this happens, the CDi encoding price will be comparable with that of putting video on tape.

Hal Josephson of the 3DO company said that software licences have been taken out by over 340 companies and that 106 titles are in the production stage. Unfortunately a technical failure prevented the demonstration of 3DO software. It's understood that Panasonic intends to launch 3DO equipment in the UK during 1994.

Interactive TV

Bill Andrews of Interactive Network Ltd. said that interactive TV will offer a variety of services including entertainment (movies on demand and computer games for example), education, commercial (such as home shopping) and information (data downloading). They will arrive at homes via a variety of paths – cable (coaxial and fibre-optic), off-air (satellite and terrestrial), telephone and cellular.

MPEG

A close look at digital technology took up the second day. Ed Thomson from Compression Labs began by describing the MPEG standard for digital video. MPEG is concerned with three main areas. First the data bit stream: for MPEG-1 the top rate is 1·5Mbits/sec while MPEG-2 offers 2-15Mbits/sec. Secondly audio: MPEG offers two or more near CD-quality sound channels. Thirdly broadcasting: MPEG is concerned with the integration of video and audio in a broadcast TV system, covering such things as synchronisation and multiplexing. MPEG does not however stipulate the type coding to be used, so companies can use their own compression algorithms. MPEG-1 has been optimised for storage media such as CD-ROMs while MPEG-2 is optimised for broadcasting – and is also 15 per cent more efficient than MPEG-1. Another group (MPEG-4) is looking at slower data rates for applications such as videophones. What about domestic MPEG encoding? Current MPEG encoders cost around £50,000-£100,000, but Dr. Alex Ballanski of C-Cube Microsystem thinks that the price will halve within a year and be as low as £10,000 in eighteen months. Home MPEG encoders won't be available for three-four years however.

Typical video system resolution figures, assuming the use of PAL, are 352 pixels x 288 lines for VHS, 480 pixels x 576 lines for TV display and 720 pixels x 576 lines for CCIR 601 studio quality. Examples of bit rates required are 10-64kbits/sec for a videophone, 1-2Mbits/sec for VHS movie quality, 3-8Mbits/sec for entertainment TV and 15-25Mbits/sec for HDTV. Ed Thomson suggested that the term 'compression ratio' is meaningless as the bit rate required depends on a number of factors including the resolution, whether the source is film or video (film is easier to compress) and programme content (a sports programme requires a faster rate than say a discussion programme). Compression Labs has developed a prototype MPEG decoder and is working on a number of digital TV projects with Thomson, Philips and Hughes – it's also part of the US digital HDTV project. The company thinks that DBS digital TV services will be available in the second quarter of 1994 (Hughes plans to launch its DirectTV satellite service in the USA during 1994, giving viewers hundreds of digital TV channels to choose from), that digital cable TV and video-on-demand (VOD) services will become available in late 1994, while digital HDTV services won't start before late 1996.

Digital Transmissions

Dr. John Forrest of NTL spoke on digital broadcasting. He began by pointing out that digital video compression isn't new – during the Seventies the IBA's engineering division (forerunner of NTL) had developed coders and decoders for inter-studio links and the satellite distribution of programmes in connection with the then only proposed fourth u.h.f. channel. The compression system was demonstrated at the 1980 IBC but wasn't adopted when Channel 4 started in 1982 as in those days satellite TV distribution was considered to be too risky.

Dr. Forrest then explained the principles of compression. A single PAL frame consists of around 700 x 570 pixels (400,000). This has to be tripled to include RGB information, giving a total of 1·2 million bits of information per frame. The image is compressed by breaking it into blocks of pixels, e.g. 8 x 8, and analysing these for regular patterns and colour and brightness levels. Because there is only one twenty-fifth of a second between each frame there is little

difference between one frame and the next: a subtraction system is used to find the differences and only these are transmitted, greatly reducing the data rate required. Compression systems also take advantage of the fact that the human eye is less sensitive to fine detail and colour variations. Most companies at work in the compression business are aiming for a data rate of around 8Mbits/sec, which gives studio quality pictures: acceptable broadcast picture quality can be achieved with a data rate as low as 2Mbits/sec.

Although Dr. Forrest's talk was mainly concerned with broadcast systems he also mentioned a system for transmitting digital video images via ordinary telephone lines. Known as Asymmetric Digital Subscriber Line (ADSL), it involves the transmission of high-quality (140Mbits/sec) video images after compression at the local telephone switching centre to 1·5Mbits/sec. ADSL would offer domestic users a very limited VOD service but the technology looks as if it has potential. Companies such as Bell Atlantic are carrying out ADSL trials.

Satellites currently use a 36MHz bandwidth transponder to transmit a single analogue channel: digital compression will enable such a transponder to carry 4-16 channels (depending on picture quality). Likewise a 30-channel cable system could use digital compression to increase the number of channels to 120.

The terrestrial u.h.f. system used in the UK requires around 4,000 transmitters to broadcast four national services. This involves the use of some forty channels. Digital TV would allow each channel to carry four programmes. The simultaneous transmission of analogue and digital services is possible, which would allow the PAL system to be phased out in the same way that the 405-line system was brought to an end. NTL's SPECTRE digital compression system has been developed for u.h.f. transmissions, but it will be up to the ITC to decide how the new services will operate.

All digital TV systems will use MPEG compression, but different modulation systems will be required for satellite, cable and terrestrial services. Dr. Forrest doesn't think we will see a standard conditional access system. Thus decoders will need to have several card slots. But a common coding system will be necessary to identify programmes and services. Likewise viewers will want to have a user-friendly system for navigation through the hundreds of channels. Dr. Forrest thinks that the TV receiver of the future will take on the appearance of a computer/terminal, be modular and upgradable.

AT&T Trials

Ken Trojniar of AT&T described several trials that have provided viewers with pay-per-view (PPV) and vision-on-demand (VOD) services. PPV enables viewers to select programmes from a schedule and pay for what they watch: VOD is more flexible, giving viewers greater choice and control over what they see and pay for. AT&T's first trial, using a system called viewer-controlled cable TV (VCTV), was carried out in Denver in 1991. AT&T and Telecommunications and US West offered viewers PPV and movies-on-demand services. A recent trial in Chicago linked the homes of fifty employees to a computer server in New York: the server provided programmes and services such as games, consumer reports, interactive sports programmes, home shopping and electronic mail. Later this year AT&T will start the Castro Valley trial, which will put Viacom's two-way cable system in 1,000 homes. Users will be able to stop, pause, rewind and fast-forward TV programmes, will be able to browse through 'video catalogues', ordering products by using a remote control handset, and there will be full-motion video games.

There have been interesting results from the Chicago trial. It established that people like the idea of a 24-hour service that provides programmes on a PPV basis. Eighty per cent of the viewers used the service actively, with half the total group using the system to plan their viewing. Those with children tended to plan their viewing more than those without. It was also found that people prefer to use a remote control unit rather than having to call up programmes over the telephone. One result was that viewers spent less on other forms of entertainment, including video rental. Not surprisingly, films and games were the most popular items. Ken Trojniar admitted that it was early days for VOD, and that the system faces two big obstacles – the provision of broadband cable to a large enough number of homes, and whether consumers are prepared to pay for these extra services.

Astra

Marcus Bicknell of the Vision Consultancy Group surveyed the current Astra satellite plant. The present three satellites 1A, 1B and 1C at 19°E provide fifty transponders that are used for analogue channels (some are used for back-up purposes however). Astra 1D, to be launched in September 1994, will increase the number of transponders to 64: it could provide a mix of analogue and digital services. Astra currectly uses the 10·7-11·7GHz FSS band, but space in the 11·7-12·5GHz BSS band could be used for an extra forty digital transponders. Astra's owner SES plans to have six co-located satellites by 1996. Depending on picture quality, a sixteen-transponder satellite using digital technologuy could provide 80-160 channels. Marcus Bicknell suggested that there could be around 3,500 digital satellite channels by the year 2004, and that by then satellite and cable systems could be in 110 million European homes.

Reception of digital satellite TV services will require new equipment. At present an LNB with a 750MHz bandwidth can be used for Astra 1A/B/C: the bandwidth will need to be increased to 1GHz to receive 1D. For reception of both analogue and digital services a switchable LNB with a 1GHz bandwidth will be required. A 'universal' LNB is under development and should be ready by 1995.

Astra is likely to face stiff competition from other companies offering digital services, for example Eutelsat, regional services such as Telecom and Tele-TV and international operators such as Intelsat. Marcus Bicknell added that while agreement has been reached on setting a common European digital transmission standard (by the Digital Video Group, see the Berlin report in the December issue) there is no agreement on conditional access. Will there be a single box that accepts smart cards from a number of programme providers or will viewers have to have lots of different decoder boxes next to their sets? One hopes that there will be a one-box solution.

3-D Systems

Toshio Motoki of NHK's science and technical research laboratories described two 3-D systems. The first uses two HDTV cameras to record left- and right-eye images which are recorded by two HDTV VCRs: the images are projected on to a 110in. screen and polarisation glasses are required to see the 3-D effect. The second system doesn't require the use of glasses. The 'auto-stereoscopic' display system is

based on lenticular stereoscopic photos, which produce a 3-D effect with still pictures. The 3-D TV version uses an LCD screen and works by projecting left and right images on to the screen as a series of vertical stripes. Light from the pixels is refracted by a series of small lenses: when this is viewed at an appropriate distance a 3-D effect is seen. NHK has developed a prototype system which uses a 50in. lenticular screen and four cameras. Sanyo, which developed the technique with NHK, plans to launch a system in Japan during 1994.

Video Storage

Dr. Tae Seok Park from Samsung's advanced institute of technology discussed storage systems for domestic video. Tape offers many advantages: as it is cheap to produce and has a high storage capacity it's likely to be the main medium for the coming generation of consumer digital video recorders, but it can't be used for interactive systems because it doesn't offer random access. Discs can offer random access, but there are problems. Today's CD-ROMs have a storage capacity of around 650Mbytes and use infra-red lasers to read them. The use of smaller pits in the disc would increase storage capacity but would require a shorter wavelength laser. Use of a red laser, with a 670nm wavelength compared with the 780-830nm of today's lasers, would increase the disc capacity by a factor of 1·5; a green laser (532nm) would give an increase of 2·5 times while a blue laser (415nm) would give an increase of four times. A 30mW red laser and a 20mW green laser for high-density recording have been developed, and a blue-green laser has also been produced, but these are all expensive. Dr. Park thinks that shorter-wavelength lasers for domestic machines will be available at around the turn of the century.

Other ways of increasing storage capacity include super-resolution technology: this increases the recording density beyond the limit set by the wavelength of the laser. One process, called magnetically-induced super-resolution (MSR), increases storage capacity by up to four times. Improved signal processing, which reduces the need for error detection, can increase disc capacity by up to 1·5 times.

The day when discs and tape are replaced by solid-state memory storage devices is a long way off in the future. The capacity of today's EPROMs and EEPROMs is around 16Mbytes, which is fine for still video cameras but not for video with movement. Dr. Park suggests that the storage capacity will be increased to around 1Gbytes by the year 2000, enough for storing an hour of compressed video on a chip device the size of a credit card. This sounds impressive but is still some way behind the capacity offered by tape – and the chips wouldn't be cheap.

In Conclusion

A discussion on likely winners and losers took place at the end of the conference. The panel felt that software producers, the providers of direct-to-home services, and companies like NTL that produce digital compression systems should do well. Sony, Bell Atlantic and Time-Warner were seen as companies to watch. Virtual reality (VR) could also become a big market, especially for entertainment and theme parks. One panellist suggested that the first company to develop a VR sex system will clean up! On a more sombre note, no one thought that consumer systems like CDi and 3DO would be successful.

ICS

AC188	0 20	2SA748	0.85	2SD2340	0.45	STK461	6 00
AD161	0 50	2SA777	0 35	2SD325	0 35	STK1050	7 25
AD162	0·50	2SA841	0 40	2SD355	0 45	STK2029	4 75
BC108	0 07	2SA893	0 50	2SD400	0 18	STK3042	4 20
BC141	0 30	2SA1011	1 35	2SD467	0 15	STK3042/2	4 75
BC142	0 20	2SA1102	1 60	2SD525	0 60	STK4191/5	18 50
BC307	0 08	2SA1123	0 49	2SD600	0 40	STK5325	4 45
BC337	0 07	2SA1175	0 40	2SD612	0 80	STK5332	1 80
BC546	0 07	2SA1282	0 80	2SD636	0 10	STK5333	2 40
BD131	0 30	2SA1307	1 50	2SD716	0 95	STK5422	4 20
BD132	0 30	2SB370	0 40	2SD725	3 50	STK5476	4 00
BD132	0 30	2SB524	0 65	2SD836	0 75	STK7348	3 15
BD743	0 38	2SB541	1 90	2SD856	0 55	STK73410	4 00
BD246	0 65	2SB546	0 55	2SD1136	0 50	STA401	3 50
BDX33	0 50	2SB618	3 05	2SD1273	0 70	STA411	3 80
BDX54	0 50	2SB641	0 11	2SD1275	0 58	STA441	2 50
BF197	0 20	2SB649	0 38	2SD1278	0 58	STR441	4 75
BF259	0 70	2SB717	0 52	2SD1398	1 40	STR451	13 95
BF494	0 16	2SB861	1 50	2SD1426	2 05	STR5412	4 40
BF681	0 30	2SB1015	0 60	2SD1441	3 50	STR41090	5 90
BFY51	0 80	2SB1016	1 10	AN318	4 40	STR50103	2 65
BFY90	2 00	2SC372	0 70	AN5011	3 50	STR59041	6 40
BU124	1 35	2SC458	0 68	AN5512	1 35	TA7157	1 20
BU180	1 90	2SC681	3 20	AN5521	1 35	TA7270	2 00
BU206	0 85	2SC741	3 00	AN6367	3 90	TA7280	2 25
BU208	0 68	2SC867	3 00	AN6673	2 25	TA7604	2 35
BU208A	0 70	2SC941	0 12	AN7115	1 40	TA8205	2 90
BU208A	0 90	2SC998	3 05	BA318	1 75	TA8207	1 65
BU326A	1 10	2SC1008	0 20	BA658	3 60	TA8210	3 50
Bu407	0 65	2SC1103	0 50	BA1330	1 50	TA8214	3 40
BU409	1 10	2SC1123	0 45	BA5466	2 50	TA8215	3 00
BU426	1 50	2SC1222	0 11	BA6219	1 20	UPC574	0 50
BU508A	0.85	2SC1327	0 78	HA1156	1 35	UPC1020	2 00
BU508V	1 35	2SC1382	0 30	HA1377	1 40	UPC1032	0 60
BU5080	1 10	2SC1429	0 55	HA11227	1 50	UPC1185	4 00
BU536	1 05	2SC1447	0 80	KA2101	1 00	UPC1230	1 50
BU626	1 45	2SC1514	0 42	KA2263	1 00	UPC1363C	1 90
BU508AF	1 20	2SC1569	0 55	LA1352	1 45	UPC1378	1 80
BU508DF	1 35	2SC1674	0 15	LA1460	2 05	UPC1394	1 50
BUT11A	0 70	2SC1767	0 36	LA4182	1 65	UPC4556	0 50
BUT11AF	0 85	2SC1815	0 12	LA4200	1 30		
BUT12A	0 85	2SC1852	0 49	LA4440	1 18		
BUT12AF	1 10	2SC1914	0 15	LA4460	1 30		
BUT56A	0 80	2SC1983	0 90	LA4700	4 40		
TIP30C	0 25	2SC2002	0 22	LA6324	1 90		
TIP31A	0 25	2SC2027	2 20	LM318	1 15		
TIP32B	0 30	2SC2076	1 10	LM723	0 45		
TIP41A	0 30	2SC2236	0 25	LM1818	2 25		
TIP47	0 45	2SC2278	1 00	LM6402	5 25		
TIP110	0 45	2SC2347	0 18	M5143P	1 40		
TIP112	0 85	2SC2500	0 25	MS220L	1 75		
TIP142	0 90	2SC2579	1 25	MS1172	2 60		
TIPL791	1 30	2SC2603	0 12	MS8484	4 50		
TIP2955	0 50	2SC2668	0 10	MB3731	2 80		
MJE340	0 25	2SC2688	0 30	MB3732	2 45		
MJE521	0 35	2SC2838	3 00	MB3756	2 20		
2N2222	0 20	2SC2979	2 00	MC1327	0 65		
2N3035	1 10	2SC3182	1 50	MC14426	2 50		
2N3773	1 50	2SC3262	3.60	MC14493	8 50		
2N6130	0 40	2SC3345	1 00	SAA1293A	4 85		
2SA350	0 60	2SC3506	3 40	SAA1293-2	5 15		
2SA606	2 85	2SC3883	2 80	SAA1293 3	5 15		
2SA679	1 95	2SC4242	1 40	SAA5010	4.95		
2SA722	0 62	2SD198	1 60	SAA5243P/E	7 15		

VOLTAGE REG

7805	0 20
7806	0 20
7812	0 20
7815	0 20
7820	0 20

THYRISTERS

15/80H	3 20
15/85R	3 20
BR103	0 30
BT151/800	0 85
TIC106M	0 40

DIODES

IN40001	0 03
IN4007	0 03
IN5408	0 10
BY127	0 10
BY133	0 10
MR854	0 10
MR856	0 12

VIDEO HEADS AT A VERY COMPETITIVE PRICE WHILE STOCKS LASTS

AIWA

AV6C 77F	10 95

FERGUSON

3V 58/FV13H	18 95
FV14T	24 80

FUNAI

VIP 3000A	

GOLDSTAR

GHV 1221 1241	11 99

GRANADA

AH3	19 00
EH3	19 00
DH2/EH2	15 00
BH1/CH1	13 00
FJ2	24 00
FM2	23 00
VBXXB1	10 95

GRUNDIG

VS160	45 00
MVS660/VS660	38 90

HITACHI

VT16/35	19 00
VT65	24 50
VT136/435/535	19 00
VT520/100/400	15 00
VT52/64	13 00
VT38/39	21 00

JVC

HRD 370/430/750	18 95
HRD 530/565	24 80
HRD 408/580	25 75

LOGIK

VR955/960	12 45

MATSUI

VX 730/750	12 45

MITSUBISHI

HS 400	28 75
HS 338	23 50
HS 330	29 00
HSB 10/20	23 00
HSE 50	34 95

NEC

DX1000/N9011/7033	15 00

PANASONIC

NV 788	25 50
NVM 1/3/5	45 00
NV480/630/FX/780	31 00
AT E100/E200	29 15
NVD80/NVF65/NVH75	38 90

NEW – NEW – NEW

Hey look time is money, if your workshop is computerised then ask for FREE evaluation disc with your next order on:

"WORKSHOP MANAGER PLUS"

Only available from us.

Ask for 1994 full catalogue

SANYO

VHR T100	33 50

SALORA

SV8550	28 75
SV9300	29 10

SAMSUNG

VB770/V1770	16 25
PX990/991/VX1260	16 90

SONY

KE-E17	10 95
SL3020/800/SL76	10 95
SL620E/SLC24	10.95

TOSHIBA

P5470/5480	10.95

NEW STOCK

TUA 2000–4	4.25
TPU 2732	12.99
MDA 2062	3.00
TMP 47C434N– 3555	20.50
TMP 47C434N–3537	17.20
TMP 47C 432AP–8189	24.15
TMP 47C 432 P–8188	24.15

IDLER TIRES

DON'T FORGET JJ'S TIRE. DUE TO RECESSION PRICE IS THE SAME. MIN 3PKTS PER ORDER

SOLE DISTRIBUTORS RA100 – DESOLDERING STATION

RA100 DESOLDERING STATION £225 + £12 + VAT RA100 + DS 3102 IRON £225 + £65 + £12 + VAT. Overseas postage accordingly. 5% surcharge if paying by credit card.

Please phone us for the types not listed. Please add 60p post & packing and then add 17.5% VAT to the total
Callers by appointment only

J.J. COMPONENTS

63 THE CHASE, EDGWARE, MIDDX. HA8 5DN, ENGLAND
Tel Fax 081 952 4641 Hotline No 081 381 1700
Free fax orderline 0800 318498
24 hr answering machine Tel: 081 952 4641

Modern TV Receiver Techniques

Part 14: Teletext

Eugene Trundle

Teletext is the oldest form of digital broadcasting technology. It has now been in use in the UK for twenty years, during which period teletext decoders have steadily shrunk in size and cost and the service has been improved. Teletext uses spare capacity in the field blanking interval to transmit data in the form of pulses that provide 'typing instructions' for pages of text and graphics. A TV set that contains a teletext decoder extracts this data from the overall transmission and stores it so that, when requested by the viewer, page readouts appear on the screen.

There are five teletext 'levels' that offer progressively better presentation of text and graphics on the screen. The 'higher' the level, the larger the memory and the more sophisticated the decoder required. Perhaps because of lack of enthusiasm amongst viewers we have, in the UK, progressed barely further than level 1, which is the most basic form of broadcast text. Access time however has been reduced by transmitting more data per TV field, by clever arrangement of the transmitted page sequences and by increasing the receiver's memory capacity.

The Field Blanking Interval

In Part 10 we saw that the field blanking period, during which the beams return from the bottom of the screen to the top to start a new field scan, lasts for a period equivalent to

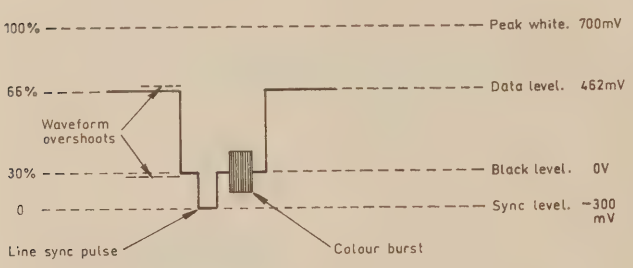


Fig. 1: Teletext data levels.

25 lines, i.e. 1·6msec. The field sync pulse group occupies 7·5 lines/480µsec of this space, leaving a period of 17·5 lines/1·12msec before the start of the video information for the first line of the next displayed TV field. This generous amount of time was originally allocated because early TV sets had a rather slow field flyback. Subsequently, with field timebases that had a faster flyback and advantages in technology at both ends of the transmission chain, it became possible to put some of these spare lines to good use: they were used to carry video insertion test signals (VITS) that provide signal identification, network switching and performance appraisal. The VITS occupy lines 19 and 20 in even fields and lines 332 and 333 in odd fields. The preceding twelve lines, 7-18 and 320-331, are used for text data.

Each text data line carries a colour burst to maintain the colour decoder subcarrier oscillator synchronisation and the usual line sync pulse. The text pulses occupy the rest of the line. This is the same period as the ordinary picture signal: 52µsec.

To prevent intercarrier buzz with f.m. sound systems the amplitude of the text pulses is limited to 66 per cent of the peak white signal, see Fig. 1. Binary zero is represented by the text signal hitting black level, binary one by the signal rising to the 66 per cent level. This represents 462mV with a standard 1V peak-to-peak video signal. The pulses are not square: they are filtered before transmission and further rounded in the receiver's i.f. and demodulator circuits. Thus by the time they reach the text decoder they are of approximately sinusoidal shape. In addition the pulses are transmitted in NRZ (non return to zero) form. This means that the signal remains high to indicate a string of binary ones and low when a string of binary zeros is being transmitted.

Text Data Format

The text data rate is 6·9375Mbits per second, which is 444 times the 625-line scan frequency. The pulses are not necessarily locked to the scan rate however. A data train representing 01010101 etc. to the end of the line will thus give rise to a quasi-sinewave at 3·46875MHz. At this rate there's room for 360 data bits on each TV line used for the purpose. These 360 bits produce a single row of text characters or graphics in the teletext screen display.

The 360 bits per line are divided into 45 eight-bit bytes. The first five of these bytes synchronise the decoder and provide an 'address' that indicates where the row is to be located in the text display. The remaining 40 bytes determine the characters in the row, which can thus have a maximum of 40 letters, numbers or graphic blocks. Where there's to be a blank or gap in the display the code for a blank space is sent so that data is always present.

The text display has 23 rows: thus a maximum of 23 x 40 = 920 characters can be displayed on a single page to make up simple maps, diagrams and alphanumeric text. Upper- and lower-case letters can be produced as well as figures, symbols and 'building blocks' for graphics, in any of eight colours formed by the three primaries plus black and white.

Fig. 2 shows the code table. Starting at the top on the left-hand side the first four bits define the row number and the next three the column number. The codes are then used to determine the character so that capital A for example would be called up by byte 1000001 (bits 1-7) while byte 1111101 produces the symbol #. Notice that to change from a capital to a lower-case letter only bit six changes, and that the codes for numbers consist of their binary equivalents followed by the code 011.

The 32 codes in columns 0 and 1 are control codes that indicate whether the codes in the following columns represent alphanumeric characters or graphics and give some 'attribute', such as a colour, to the characters in the row. These control codes all have bits 6 and 7 at zero: they produce no display themselves, occupying a single blank space in the displayed row – usually in the background colour of the preceding character.

Protection

Because the data is subject to interference and noise during its journey from the transmitter to the decoder protection against data corruption is required. It's provided

b_7 b_6 b_5 →						0_0	0_1	0_1	0_1	1_0	1_0	1_1	1_1	1_1	1_1
Bits	b4	b3	b2	b1	↓ Row / Col →	0	1	2	2a	3	3a	4	5	6	6a	7	7a
	0	0	0	0	0	NUL①	DLE①			0		@	P	—		p	
	0	0	0	1	1	Alpha^n Red	Graphics Red	!		1		A	Q	a		q	
	0	0	1	0	2	Alpha^n Green	Graphics Green	"		2		B	R	b		r	
	0	0	1	1	3	Alpha^n Yellow	Graphics Yellow	£		3		C	S	c		s	
	0	1	0	0	4	Alpha^n Blue	Graphics Blue	$		4		D	T	d		t	
	0	1	0	1	5	Alpha^n Magenta	Graphics Magenta	%		5		E	U	e		u	
	0	1	1	0	6	Alpha^n Cyan	Graphics Cyan	&		6		F	V	f		v	
	0	1	1	1	7	Alpha^{n}② White	Graphics White	'		7		G	W	g		w	
	1	0	0	0	8	Flash	Conceal Display	(		8		H	X	h		x	
	1	0	0	1	9	Steady②	Contiguous② Graphics	)		9		I	Y	i		y	
	1	0	1	0	10	End Box②	Separated Graphics	*		:		J	Z	j		z	
	1	0	1	1	11	Start Box	ESC①	+		;		K	←	k		1_4	
	1	1	0	0	12	Normal② Height	Black② Background	,		<		L	1_2	l		II	
	1	1	0	1	13	Double Height	New Background	-		=		M	→	m		3_4	
	1	1	1	0	14	SO①	Hold Graphics	.		>		N	↑	n		+	
	1	1	1	1	15	SI①	Release② Graphics	/		?		O	#	o			

Fig. 2: ASCII codes used for teletext data transmission. Codes can be referred to by their column and row, e.g. 2/5 = %. Control characters marked (1) are reserved for compatibility with other data codes; those marked (2) are presumed before each row begins.

by adding an 'odd-parity bit' at the end of each of the seven-bit codes shown in Fig. 2 so that each becomes an eight-bit byte. The idea is that the parity bit added always results in an odd number of one bits in the byte. The decoder can then check whether any bytes with an even number of ones have been received and reject these as being corrupt. This simple system has two limitations: it doesn't work if an even number of bits in the byte are incorrect, and it doesn't provide data correction. Despite this it is adequate for use with text symbols, where a minor error often goes unnoticed, and is anyway corrected when the page is cyclically updated.

Some of the transmitted data requires greater protection however. If anything goes wrong with the data that determines the page number the wrong page could appear on the screen when it's called up by the viewer, while if the row address data is wrong the row will appear in the wrong place on the screen. To avoid this the bytes that provide this information and the real-time clock data are heavily protected by means of a Hamming code, in which every alternate bit is a parity bit: bits 2, 4, 6 and 8 convey data while bits 1, 3, 5 and 7 provide protection – see Table 1. This enables single-bit errors to be detected and corrected by inversion. The penality incurred is that the amount of information conveyed by the byte is reduced.

Row Coding

The first row of a transmitted page, row 0, is the most important one since it contains the magazine and page numbers, the service name, the date and time. It's called the header row. To capture a page for display the viewer keys in the magazine and page numbers: when this keyed-in data corresponds with the transmitted code the relevant page is selected and displayed on the screen.

The data format for the header row is shown towards the

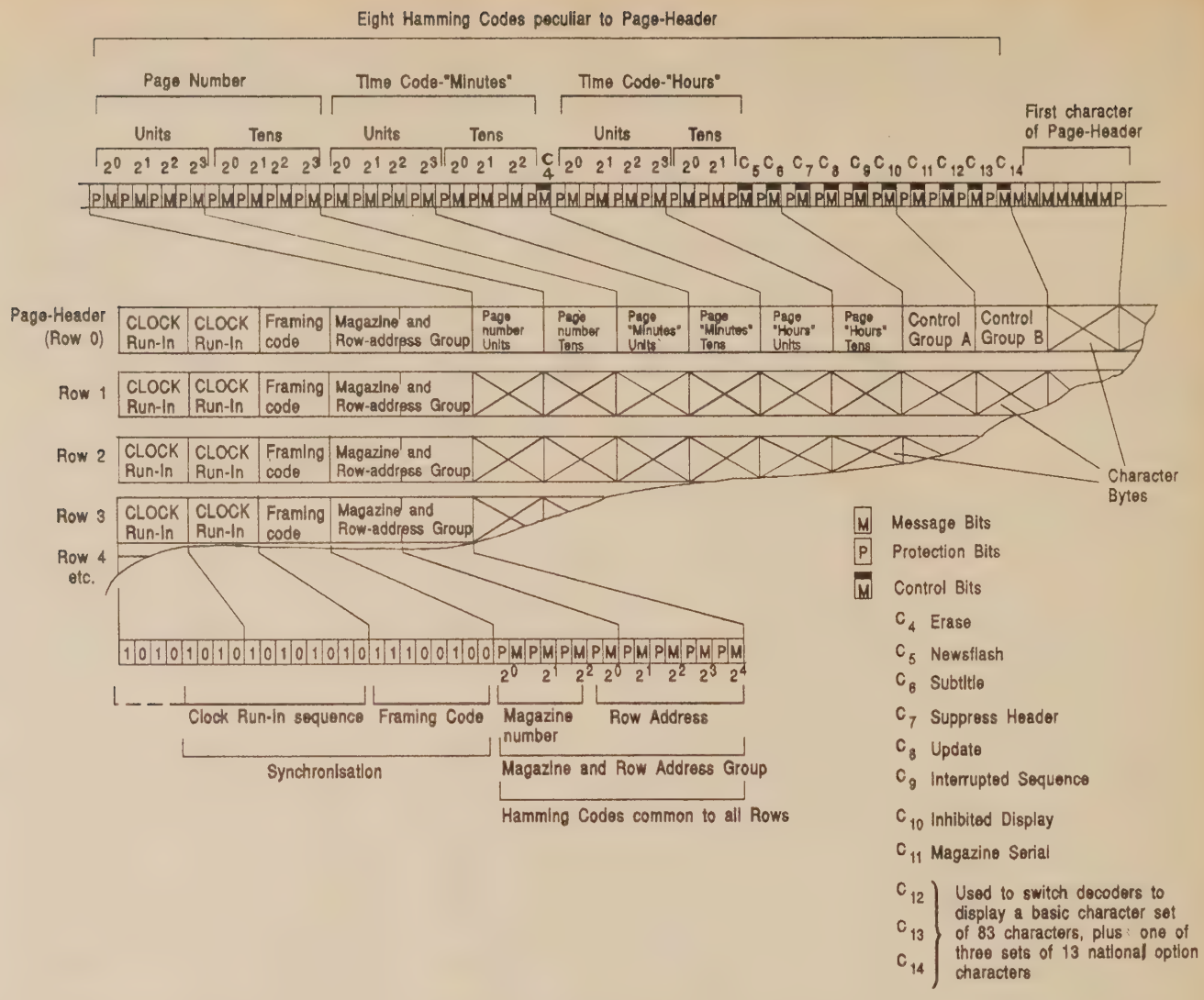


Fig. 3: Teletext row coding. The 'diamond-crossed' bytes carry display data, 32 characters in the header row and 40 in the others.

top in Fig. 3. There's first a clock run-in sequence that consists of two bytes carrying a series of ones and zeros – 101010 etc. This synchronises the decoder's bit-sampling clock oscillator. Next comes a framing code byte whose purpose is to identify the start of the data bytes in the following pulse train. Its pattern is 11100100, chosen to give a reliable reset signal to the rest of the decoder and to be amenable to correction by a circuit that's able to put right single-bit errors. Fig. 4 shows the principle of the framing code detector: when the and gate's output goes high it signals to the decoder that the next bit is the first one of the first data byte. Thereafter the circuit is reset at eight-bit intervals by a byte clock, thus individually partitioning off the bytes.

The next two bytes, which are Hamming-protected, provide the magazine and row-address information. In the header row this is followed by page number and time code (not necessarily real time) bytes to enable the viewer to select a particular page at a specified time. Two bytes that provide control information relating to the whole page follow – the codes that govern news flash, subtitle, update and similar functions, all with Hamming protection.

Eight data bytes of the header row have thus been used, leaving 32 for the display of characters. Except for the page number, the header row text is the same for all the pages of any one transmission: it shows the name of the service (Ceefax, Skytext, etc.) and the day, date and real time in hours, minutes and seconds.

The following rows have the same clock run-in and framing codes as the header row. These are followed by individual magazine and row-address bytes, which are the only ones that have Hamming protection in an 'ordinary' row. Bytes 6 to 45 contain eight-bit codes for the text or graphics in the line. Each byte is transmitted with the LSB (least significant bit) first and the parity bit last.

Control Codes

Some further explanation is required for columns 0 and 1 in Fig. 2. At the beginning of each transmitted row the decoder assumes that what follows will be steady, normal-height white alphanumeric characters on a black background, also that any graphic blocks will be contiguous (joined together). Any change from this, at any point along the line, requires the insertion of a control byte to tell the decoder. Thus if the second half of a row is to be concealed (say it's a quizz answer), the 'question' text will be followed by the code 0001100 then the answer code. The answer will then be revealed only when the viewer keys 'reveal'. The next row will be reset automatically. Thus if this is to be concealed the first byte must again be 0001100. Similarly if one word in a row is to flash it must be

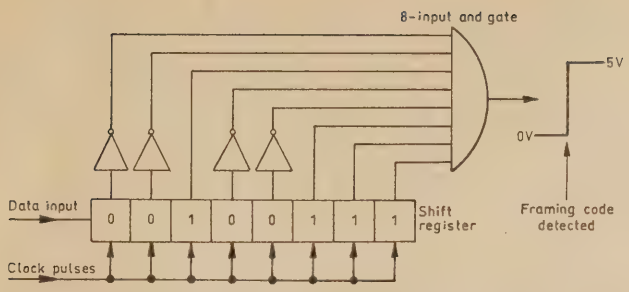


Fig. 4: Framing code detector: only the bit pattern 11100100 can open the and gate to produce a 0-5V transition. The clock pulses step the bits rightwards through the shift register.

preceded by code 0001100 then code 1001000.

Suppose that we want to transmit a row with red graphics at the left changing to green graphics half way across, perhaps as part of a map or diagram. After the row coding the first byte will be 1000100 to set the display mode followed by the graphics codes. Just before the transition to green point code 0100100 is sent to change the colour, followed by more graphics codes. There doesn't have to be a gap in the display where the control byte is inserted: in the graphics-hold mode (column 1, row 14, Fig. 2) the decoder repeats the previous graphic symbol in the control code space. This can't be done with alphanumeric characters, so the control byte in this case produces a gap in the display: it appears in the background colour.

Because bits 6 and 7 of these control codes are both at zero they are sent straight to the character generator at the output end of the decoder.

Page Transmission and Access Time

We've seen that each text line transmitted during the field blanking period can produce one row of text on the screen. So with 24 rows in the display 24 lines will be required. As the current rate is 12 teletext lines per field, it takes two fields to transmit a single teletext page. At a field rate of 50 per second, 25 pages a second can be transmitted – 1,500 pages a minute. Thus access time – the period between requesting a page and its appearance on the screen – largely depends on the number of pages being transmitted. If 750 pages are being transmitted the worst-case access time will be 30 seconds and the average wait 15 seconds – this is with the pages transmitted repeatedly in sequence.

To improve the system's 'user-friendliness' high-priority pages such as indexes and commonly-used pages are transmitted more often than others. Another time saver is the 'row-adaptive' feature, which enables the totally blank rows that occur in many text pages to be omitted from the data stream. It's also possible to interleave the text rows of several pages to give a perceived improvement in the access time: this is why each row has a magazine number (see Fig. 3). Subtitles (page 888) have the highest priority: they are transmitted on the first available line after the cueing point.

These techniques are limited in their effectiveness: in most cases they shorten the access time to some pages while lengthening the wait for others. From the user's point of view the most effective reduction in page access time comes from the use of the Fastext system.

Memory Capacity and Fastext

As the parity bits don't have to be stored the memory capacity required for a single page of text is 24 (rows) x 40 (characters) x 7 (bits), which comes out at 6,720 bits. This is the amount of memory that was provided in the earliest text decoders. Later types have a two-page memory (2K x 7 bits in practice) and automatically store the page following the one being displayed. Thus if you select page 100, page 101 will also be captured and held and can be called up for immediate display. This action prompts the decoder to search for, acquire and store the next page (102) in the now unused half of the memory, overwriting the stored page 100 with the page 102 data. Philips Components uses this system in the popular Euro-CCT (Computer Controlled Teletext) decoder.

A Fastext decoder incorporates a larger memory that can hold the selected page and the next seven, which are automatically loaded in sequence by the decoder. This is based on the premise that viewers usually step through pages sequentially. As each page is discarded the next page in the sequence is loaded. Thus virtually instantaneous page display is achieved.

The broadcaster's text editor can assist with the Fastext function by anticipating the user's requirements and sending additonal instructions to the decoder, based on the current page and its contents, for extra page acquisition. This works as follows. The bottom row of the text page has four colour-coded prompts which may typically be news, sports, travel and financial information. The remote control handset has four buttons with corresponding colours. Pressing any one of these selects magazine and page numbers simultaneously, loading appropriate pages into the memory for instant selection. If travel is selected for example the coloured prompts may change to air, sea, road delays and continue, the latter providing an escape from the travel menu.

A 'packet' system, in which additional data rows are transmitted but not necessarily displayed on screen, is used for Fastext data acquisition. The packets contain additional control data rather than characters and are sent before the teletext pages (which become packets 0 to 23) so that the control data arrives before the actual page. Packet 24, which is displayed as a row, is used for the Fastext prompts while packet 27 provides the page-linking data.

There are eight packets in the text specification for various purposes that include extended character sets (primarily for other languages) and general-purpose data

Table 1: Hamming code protection.

Message	*Hamming coded bits*							
	1	2	3	4	5	6	7	8
0	1	0	1	0	1	0	0	0
1	0	1	0	0	0	0	0	0
2	1	0	0	1	0	0	1	0
3	0	1	1	1	1	0	1	0
4	0	0	1	0	0	1	0	0
5	1	1	0	0	1	1	1	0
6	0	0	0	1	1	1	0	0
7	1	1	1	1	0	1	0	0
8	0	0	0	0	1	0	1	1
9	1	1	1	0	0	0	1	1
10	0	1	1	0	0	0	1	1
11	1	1	0	1	1	0	0	1
12	1	0	0	0	0	1	0	1
13	0	1	0	1	1	0	1	1
14	1	0	1	1	1	1	1	1
15	0	1	0	1	0	1	1	1

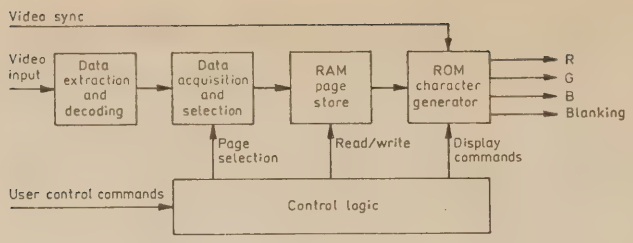


Fig. 5: Basic decoder block diagram to show the working principle.

transmission. Packet 30 is an interesting one, providing PDC (Programme Delivery Control) for VCRs. More on this later.

Decoder Overview

Fig. 5 shows a teletext decoder in the simplest possible block diagram form. The first block removes the data pulses from the video signal and decodes them. The next block selects the data requested by the viewer, according to instructions sent via the control logic block, and passes it to the page memory (RAM) whose write-in control signal also comes from the control block. Read-out from the RAM is again governed by the control block: it occurs at a slower rate, a complete field scan period being required for a page in the memory to be read out – it's written in during short 52µsec bursts at varied intervals. The data from the RAM is passed to a character-generator ROM which uses it to produce the characters, graphics and symbols shown in the body of Fig. 2 and to give them the colours and attributes dictated by the control data stored with the character codes. The ROM chip's outputs consist of RGB signals in serial data form plus a blanking pulse train. They are all passed to an RGB signal processing chip of the type described in Parts 6 and 7 of this series, after which the RGB signals are applied to the picture tube.

Decoder Operation

Fig. 6 provides a more detailed idea of the internal workings of the decoder. A composite video signal (video plus sync) at about 2V peak-to-peak is fed in at the left-hand side. The sync pulses are stripped from it and fed to field sync and line divider stages. They are also passed to the set's timebase generators and continue (generated within the decoder) when there's no TV signal present so that stored pages can, if required, be viewed 'after hours'.

The two clock run-in bytes synchronise and phase lock the data clock, which supplies 6·9375MHz pulses to the data separator to enable it to make zero or one decisions with each received bit. An adaptive slicer is used here, like the one described on page 505 of the June 1993 issue. The serial pulse train produced in this way must next be converted to parallel form. This is done by clocking the pulses into an eight-bit shift register then stepping them out into an eight-line bus each time the clock divider is reset by the framing code detector shown in Fig. 4. The eight data bits in the byte thus captured are held in the data latch (centre of Fig. 6) ready for transfer into the memory.

The bytes are checked for corruption, one at a time, in the parity-check block which puts up an error-inhibit flag in the read/write control block when a byte with incorrect parity is detected.

The Hamming-coded bytes are similarly checked, and

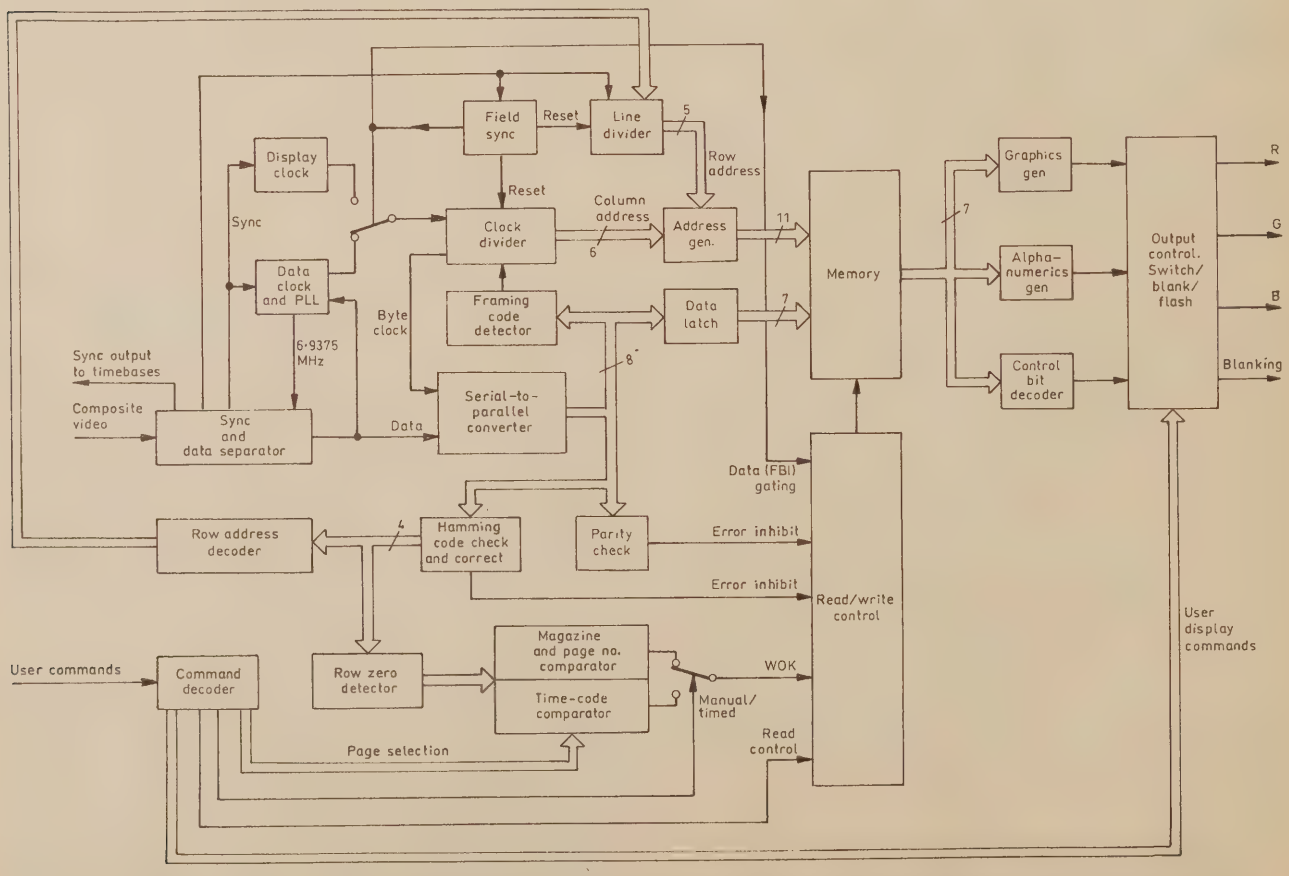


Fig. 6: A more detailed decoder block diagram to show the basic operation: practical processing arrangements are much more complex than this.

corrected if necessary, in the Hamming checker. This again inhibits the write-into-memory cycle should it detect an uncorrectable byte error. The data output from the Hamming block is in four-bit parallel form – four bits because, as we saw in Table 1 and Fig. 3, the other four bits in the byte are parity bits. It passes to the row address decoder which tells the memory, via the address generator, where the following 40 bytes of data are to be stored; and also to the row 0 detector which comes to life when it sees the row 0 code in the two bytes immediately after the framing code. The row 0 detector produces magazine, page and time-code data which are latched into comparators for updating each time a new header row is transmitted. The other input to each comparator consists of data entered by the viewer. When the magazine and page numbers at both sides of the comparator match exactly a WOK (Write OK) signal is passed to the read/write section, permitting data to be written into the memory from the seven-bit data latch. In the timed-page mode, transmitted and user-logged time codes are compared to produce the WOK command.

Thus the conditions required for a write-into-memory operation are: that the magazine and page numbers (and if required the time code) matches that requested by the viewer; that the data is complete and uncorrupted; and that the control bits in the header row are present and correct. When all these conditions have been satisfied the data is written into a memory address specified by the row and column address lines. In most decoders the memory has a two- or eight-page capacity that's automatically filled with data representing one or more linked pages as described earlier. Memory access time must be well under 1µsec, which is the nominal period between displayed characters.

Data from the viewer's infra-red remote control handset is fed into the command decoder in serial form, typically via an I2C bus. After serial-to-parallel conversion it's passed to the comparators and to the character output contol section to operate such functions as reveal and superimpose.

Next Month

We've now seen how the text data is acquired and stored in memory: next month we'll look at readout and character generation, then relate all this to practical teletext decoders and the chips they use.

HELP WANTED

Wanted: Scan coils for the NEI Model 1451 and an M5142 audio demodulator/driver chip for the Sony Model KV1320. Jeff Smalley, EVA Services, 39b Rodmell Avenue, Saltdean, East Sussex BN2 8PG. 0273 301 514.

Wanted: Tuner for the Hitachi Model CNP190 (type ET512B B21-25 with connection to the contrast control and press-buttons). Also a BU508A transistor. Donald Bills, 69 Greenfields Road, Kingswinford DY6 8EG.

Wanted: RGB panel (part no. 29301-046-02) for the Grundig Model 8632 or a TDA2800 chip. Andy Rashid, 23 Crawley Road, Leyton, London E10 6RJ.

Wanted: BX3983 chip for a Sony SLC9UB VCR – a scrap machine, board or just the chip would do. Adrian Howman, 32 Dereham Road, Pudding Norton, Fakenham, Norfolk NR21 7NA. 0328 864 348.

Next Month in TELEVISION

SERVICING THE SONY TR55

Keith T. Keeton reports on his servicing/fault experiences with this palmcorder: introduced in 1989, this compact camcorder was remarkable in being the first full-feature machine to break though the lkg barrier – with battery and tape is weighs 990g.

THE PANASONIC ALPHA 3 CHASSIS

The Alpha 3 was probably the most complex chassis produced by Panasonic at Cardiff. Its many features include black-level expansion, which stretches the contrast curve in the dark picture areas to reveal hidden detail, extensive on-screen displays and a self-test mode to help the service engineer. A new series will look at the chassis' features and circuitry.

AUTO GREY-SCALE FAULTS

Steve Beeching looks at the operation of a typical automatic grey-scale correction circuit and describes the fault conditions he has experienced.

CD PLAYER REPAIRS

Les Austin starts an occasional series on CD player servicing. Initial points dealt with include the cost of replacement laser units, the type of scope required and some fault notes.

TELETEXT – CONTINUED

In the concluding part of his account of teletext decoder operation Eugene Trundle describes the way in which the retrieved data stored in the page memory is read out and converted by the character generator ROM to form a screen display, some current decoder chip sets and a couple of related services including programme delivery control for VCR timer operation.

ORDER FORM

To.....
(Name of Newsagent)

Please reserve/deliver the March issue of TELEVISION (£2·20), on sale February 16th, and continue every month until further notice.

Name.....

Address.....

.....

ECONOMIC DEVICES 32 TEMPLE STREET, WOLVERHAMPTON, WV2 4AN

15/80H	3.83	2SC1398	0.80	2SD468C	0.00	BB105B	0.24	BD190	0.31	BF959	0.18	BYW56	0.46	M192B1	1.86	SG613	18.79	TA7176P	1.30	TDA1190Z	4.08	TEA1009	1.61
15/85R	3.84	2SC1413A	1.30	2SD476	0.97	BC107B	0.20	BD201	0.40	BF960	0.27	BYX55600	0.20	M21C	1.65	SGSIF344	6.62	TA7193AP	3.36	TDA1200	0.91	TEA1014	1.87
17052	3.85	2SC1509	0.51	2SD525	1.27	BC108	0.15	BD203	0.46	BF966	0.61	CA1310E	0.78	M293	14.63	SKE4F104	0.97	TA7193P	7.09	TDA1270	1.79	TEA1039	2.15
17053	2.38	2SC1520	0.54	2SD551	5.81	BC109A	0.16	BD232	0.28	BF970	0.30	CA3094	3.06	M490	15.30	SKE4F210	0.87	TA7205AP	1.51	TDA1412	0.77	TEA2018A	1.49
17088	2.38	2SC1573	0.36	2SD613	0.63	BC109B	0.15	BD234	0.25	BFR39	0.35	CD4001	0.14	M491	7.94	SKE5F310	1.68	TA7207P	1.68	TDA1506	4.59	TEA2164	2.68
17089	3.39	2SC1573Q	0.26	2SD636	0.14	BC117	0.14	BD237	0.30	BFR41	0.44	CD4011	0.21	M50115AP	3.24	SL1430	1.41	TA7210P	1.50	TDA1510	2.54	TEA2165	6.26
17127	1.77	2SC1675	0.09	2SD637	0.12	BC139	0.33	BD238	0.11	BFR90	0.61	CD4013	0.34	M51102L	1.77	SL1431	1.70	TA7214P	3.74	TDA1512	3.17	TIC106D	0.55
1N4001	0.04	2SC1685	0.17	2SD667	0.26	BC140	0.21	BD239	0.29	BFR90A	0.77	CD4016	0.14	M51231P	2.03	SL1432	2.10	TA7217AP	1.27	TDA1515A	2.54	TIC106M	0.75
1N4002	0.07	2SC1740	0.12	2SD669	0.63	BC141	0.34	BD241	0.41	BFR91	0.43	CD4021	0.43	M51393AP	4.64	SL471	1.70	TA7222	1.24	TDA1516Q	3.56	TIC45	0.59
1N4003	0.05	2SC1741	0.17	2SD669A	0.63	BC147A	0.06	BD243	0.39	BFR96	0.53	CD4052	0.29	M51515L	2.01	SL490	2.31	TA7222AP	1.27	TDA1518Q	3.32	TIL100	0.52
1N4004	0.07	2SC1815	0.14	2SD716	1.46	BC148	0.12	BD243A	0.43	BFW92A	0.48	CD4053	0.20	M51521L	0.54	SN29764AN	1.99	TA7227P	2.29	TDA1670A	2.81	TIP110	0.36
1N4005	0.06	2SC1826	0.72	2SD718	1.45	BC148A	0.06	BD243C	0.44	BFX85	0.55	CD4066	0.30	M5218L	0.48	SN7474N	0.38	TA7230P	1.60	TDA1701	4.86	TIP112	0.00
1N4006	0.06	2SC1827	1.00	2SD734	0.24	BC148B	0.04	BD244A	0.34	BFY50	0.34	CD4069	0.17	M5231L	0.55	SN76013ND	7.99	TA7233P	1.95	TDA1870	3.37	TIP112H	0.58
1N4007	0.06	2SC1845	0.20	2SD762	1.51	BC149	0.04	BD244C	0.42	BFY51	0.34	CD4070	0.21	M53216P	1.48	SN76227N	1.07	TA7240P	2.46	TDA1904	1.21	TIP120	0.57
1N4148	0.04	2SC1846	0.51	2SD774	0.43	BC149C	0.04	BD245C	0.72	BR100	0.17	CNX62A	2.95	M54543L	1.61	SN76666N	1.26	TA7241	2.30	TDA1905	0.94	TIP121	0.42
1N4448	0.06	2SC1923	0.14	2SD787E	0.36	BC157	0.13	BD246C	0.71	BR101	0.98	CR3CM	2.62	M54544L	1.87	SN76705AN	1.70	TA7250	4.03	TDA1908A	1.14	TIP126	0.48
1N5061	0.38	2SC1942	3.33	2SD837	0.90	BC159	0.06	BD278A	0.56	BR103	0.53	CRO2AM	2.17	M54548L	3.29	STA341M	2.54	TA7267P	2.02	TDA1940	2.77	TIP132	0.46
1N5402	0.12	2SC1959	0.11	2SD841	1.34	BC161	0.27	BD317	0.87	BR303	1.22	CV12E	2.70	M54644BL	3.30	STA401	2.45	TA7270	1.68	TDA1950	1.86	TIP137	0.48
1N5404	0.13	2SC1969	2.46	2SD856	0.94	BC167	0.42	BD318	1.10	BRX44	1.02	CX109	7.95	M54648L	6.62	STA441C	2.80	TA7270P	1.73	TDA2002	0.85	TIP2955	0.83
1N5406	0.12	2SC1983	1.78	2SD869	3.28	BC171B	0.14	BD380	0.34	BRY56	0.43	DTA124EF	0.13	M54898AP	20.45	STK0029	5.88	TA7271P	1.76	TDA2004	1.27	TIP29C	0.30
1N5408	0.12	2SC2001	0.14	2SD870	3.81	BC177	0.14	BD433	0.29	BSS38	0.23	DTA144EF	0.17	M58485P	5.95	STK0039	7.11	TA7273	3.21	TDA2005	1.36	TIP29E	0.46
1N914	0.04	2SC2073	0.51	2SD871	5.08	BC178	0.11	BD434	0.34	BT120	1.28	ER1400	2.15	MB3730	2.38	STK0040	7.40	TA7274P	2.72	TDA2006	1.06	TIP3055	0.77
1S1555	0.22	2SC2078	0.77	2SD880	0.48	BC182L	0.06	BD435	0.38	BT129	3.26	HA11235	1.95	MB3731	2.20	STK0059	9.75	TA7280	2.11	TDA2009	2.29	TIP30C	0.17
1S2076	0.29	2SC2141	1.48	2SD882	0.43	BC182LB	0.06	BD436	0.32	BT139600	1.14	HA11244	3.83	MB3732	2.88	STK025	9.61	TA7299	2.34	TDA2020	3.72	TIP31A	0.32
2N2219A	0.27	2SC2166	1.27	2SD898B	4.23	BC184	0.09	BD437	0.32	BT151/500R	1.10	HA1124A	1.21	MC13002P	5.74	STK3042	6.90	TA7313AP	0.62	TDA2030H	0.61	TIP31B	0.30
2N2222	0.22	2SC2168	0.85	2SD904	5.95	BC184L	0.04	BD438	0.31	BT151800	1.15	HA11423	2.02	MC1310P	0.85	STK3062	8.88	TA7317P	0.93	TDA2030V	1.05	TIP31C	0.44
2N2905	0.21	2SC2236	0.25	2SD973	0.38	BC184LC	0.10	BD441	0.34	BU205	1.07	HA11440	2.92	MC1327AP	1.62	STK4131	7.79	TA7325P	0.45	TDA2170	2.55	TIP32A	0.39
2N2926G	0.37	2SC2271	0.22	74LS00	0.21	BC204	0.14	BD442	0.29	BU208A	1.16	HA1166X	3.43	MC1330AIP	1.26	STK4141	9.31	TA7343AP	0.72	TDA2270	1.68	TIP32C	0.38
2N3053	0.36	2SC2274	0.22	7805	0.28	BC207B	0.23	BD510	1.34	BU208D	1.53	HA11713	1.24	MC1350P	1.82	STK4142	8.21	TA7358P	0.78	TDA2530	3.76	TIP33A	0.92
2N3054	0.98	2SC2274K	0.22	7808	0.30	BC212B	0.06	BD529	0.97	BU326A	1.36	HA11741	6.77	MC1352P	1.45	STK4162M	9.51	TA75358P	0.68	TDA2540	0.88	TIP33C	0.80
2N3055	0.77	2SC2314	0.33	7812	0.30	BC212L	0.06	BD530	1.10	BU406	0.68	HA11745	5.10	MC1358P	1.59	STK4171	10.50	TA7607AP	2.52	TDA2541	0.72	TIP34	0.00
2N3442	1.00	2SC2335	1.43	7815	0.30	BC213	0.11	BD535	0.43	BU406D	1.02	HA13001	1.72	MC14528BCP	1.70	STK4181	12.85	TA7609P	1.95	TDA2560	4.46	TIP34C	0.89
2N3702	0.11	2SC2458	0.12	7818	0.41	BC214L	0.09	BD536	0.48	BU407	0.53	HA13108	3.56	MDA2062	2.21	STK4181A	12.46	TA7630P	1.87	TDA2576A	5.95	TIP41A	0.38
2N3704	0.14	2SC2482	0.34	7905	0.34	BC237	0.10	BD675	0.30	BU407D	0.97	HA13118	1.87	MJ2955	0.97	STK4332	5.54	TA7640AP	0.98	TDA2577A	4.25	TIP41C	0.37
2N3773	1.27	2SC2547E	0.24	7912	0.43	BC237B	0.05	BD677	0.32	BU426A	0.96	HA13119	2.03	MJ802	2.37	STK4352	1.70	TA7676P	4.25	TDA2578A	2.55	TIP42A	0.39
2N3819	0.34	2SC2565	8.46	AA119	0.36	BC238	0.11	BD707	0.51	BU426E	2.13	HA13403	4.66	MJE13005	0.85	STK437	8.30	TA7680AP	3.81	TDA2581	5.75	TIP42C	0.37
2N3904	0.11	2SC2570A	0.29	AA143	0.13	BC238B	0.05	BD839	0.51	BU500	1.32	HA1377	2.42	MJE2955	0.68	STK4392	5.92	TA7698AP	9.53	TDA2581Q	10.15	TIP47	0.51
2N4444	3.22	2SC2577	1.46	AC127	0.11	BC239	0.04	BD901	0.51	BU508A	0.95	HA1388	2.63	MJE3055	0.51	STK441	11.81	TA7705P	1.68	TDA2582	1.95	TIPL791A	1.24
2N6292	0.62	2SC2581	3.05	AC141K	0.46	BC252B	0.07	BD902	0.51	BU508AF	1.27	HA1389	2.52	MJE340	0.50	STK459	11.17	TA7769P	1.43	TDA2591	1.15	TIS43	0.66
2SA1015	0.10	2SC2632	0.43	AC176K	0.30	BC300	0.48	BD911	0.65	BU508D	1.27	HA1392	1.61	ML923	14.26	STK461	10.49	TA8205	3.89	TDA2593	0.75	TL011CP	1.36
2SA1016	0.17	2SC2655	0.25	AC187	0.16	BC301	0.28	BD912	0.63	BU508DF	1.87	HA1397	2.63	MN1405VKF	11.08	STK4843	11.10	TA8210H	4.74	TDA2594	2.21	TL071CP	0.38
2SA1020	0.43	2SC2671	0.68	AC187K	0.33	BC302	0.36	BDV65B	1.16	BU508V	1.43	HA1398	2.33	MN1435VX	14.35	STK5211	15.78	TA8215	4.57	TDA2595	2.41	TL494	1.61
2SA1020Y	0.43	2SC2688	0.30	AC188	0.36	BC303	0.22	BDW84C	1.28	BU526	1.41	HA1452	4.86	MN1435VXB	10.66	STK5322	6.35	TA8691N	6.67	TDA2600	3.08	TMP47C432AP	11.24
2SA1095	7.44	2SC2785	0.12	AC188K	0.82	BC307	0.06	BDW93C	0.59	BU536	1.60	HM6232	10.36	MN650	2.50	STK5325	5.92	TAG626	1.05	TDA2611A	0.64	TMP47C434N-3555	17.87
2SA1102	2.54	2SC2791	5.44	AD149	0.52	BC307A	0.06	BDW94C	0.46	BU608	1.44	HM6251	9.52	MPSA42	0.23	STK5326	6.20	TBA120	0.53	TDA2611AQ	2.03	UC3844	1.78
2SA1143	0.17	2SC3150	1.44	AD161	1.02	BC307B	0.06	BDX32	1.70	BU705	1.61	HM7103	14.07	MPSA56	0.12	STK5331	3.02	TBA120AS	0.96	TDA2640	4.13	UPA81C	0.94

SPECIAL OFFERS – ENDS 28/02/94 OR WHILE STOCKS LAST

BU208A x 5	3.99	'F' CONNECTOR (SCREW TYPE) x 25	3.00
BU 426A x 5	3.50	TDA 2600 x 2	3.95
BU 508A x 5	3.60	TDA 2579A x 2	5.00
BU 508AF x 5	5.00	TDA 3562A x 2	3.99
BUT 11AF x 5	3.25	TDA 3654 x 2	2.20
TV FAULT FINDING GUIDE	9.99	TDA 4501H x 2	2.49
VIDEO FAULT FINDING GUIDE	9.99	TDA 4601 x 2	2.50
SATELLITE FAULT FINDING GUIDE	14.95	TDA 4601D x 2	2.95
CO AXIAL AERIAL PLUG x 25	3.75	STR 54041 x 2	7.50

2SA1175	0.25	2SC3153	2.37	AD162	0.96	BC308	0.06	BDY20	2.13	BU806	0.82	ICH28I	0.26	MPSA93	0.09	STK5332	2.74	TBA120S	0.89	TDA2652	14.32	UPC1181H	6.80
2SA1186	3.73	2SC3156	4.22	AF124	0.77	BC308A	0.09	BF115	0.41	BU806A	0.80	KA2101	0.83	MR854	0.14	STK5333	4.28	TBA120T	0.51	TDA2653A	3.26	UPC1182H	5.95
2SA1208	0.34	2SC3182	3.25	AF127	0.59	BC308C	0.06	BF179	0.31	BU807	0.51	KBL08	0.47	MSM5840H	15.36	STK5372	3.40	TBA120U	0.39	TDA2680	5.10	UPC1185H	10.20
2SA1265	1.95	2SC3225	0.50	AF139	0.29	BC327	0.10	BF184	0.41	BU826A	1.59	KSR1004	0.09	MVS240	0.53	STK5421	2.60	TBA2800	1.62	TDA3190	1.27	UPC1188	3.83
2SA1286	0.39	2SC3795	1.95	AF239	0.43	BC327B	0.17	BF185	0.29	BU908	1.17	L200CV	1.13	NE545B	3.20	STK5422	6.38	TBA395	0.68	TDA3190P	1.36	UPC1212C	0.83
2SA473	0.71	2SC380	0.12	AF279	0.34	BC328	0.07	BF194	0.22	BUK444	2.38	LA1201	0.56	NE555	0.21	STK5451	5.27	TBA520	0.85	TDA3300B	20.88	UPC1228HA	0.56
2SA562	0.17	2SC388A	0.59	AL102	5.08	BC337	0.09	BF196	0.15	BUT11	0.77	LA1230	1.95	NE555N	0.37	STK5466	4.71	TBA540	1.97	TDA3330	10.78	UPC1230	2.21
2SA634	0.54	2SC458	0.10	AN3821K	7.23	BC337L	0.22	BF197	0.34	BUT11A	0.85	LA1385	1.65	NE592	1.85	STK5471	4.51	TBA540Q	0.77	TDA3541	0.95	UPC1230H	2.80
2SA639S	0.83	2SC536	0.09	AN5265	1.75	BC338	0.06	BF198	0.17	BUT11AF	0.85	LA3161	0.40	NE646N	2.63	STK5476	5.00	TBA560C	2.02	TDA3560	3.65	UPC1278H	2.66
2SA673	0.09	2SC710	0.12	AN5435	1.45	BC368	0.25	BF199	0.04	BUT12A	0.85	LA4140	0.37	NP1106	11.86	STK5481	6.12	TBA570A	1.77	TDA3561A	3.31	UPC1318	2.96
2SA684	0.43	2SC867A	5.25	AN5512	2.14	BC369	0.17	BF200	0.39	BUT56A	1.19	LA4182	1.75	OA47	0.25	STK5482	4.06	TBA651	1.01	TDA3562A	4.21	UPC1335V	3.91
2SA733	0.17	2SC945	0.12	AN5515	2.33	BC372	0.47	BF240	0.11	BUW11	0.99	LA4192	1.14	OA90	0.59	STK6962	2.59	TBA750Q	5.10	TDA3565	2.29	UPC1351C	1.70
2SA769	1.27	2SD1051	0.48	AN5521	2.14	BC546A	0.06	BF244	0.30	BUW11A	0.90	LA4220	1.29	OA91	0.15	STK7216	5.53	TBA800	0.51	TDA3566	3.40	UPC1353	1.34
2SA798	0.41	2SD1128	1.02	AN5612	2.97	BC547	0.11	BF245A	0.19	BUW41B	1.02	LA4261	2.29	R2540	2.98	STK7226	8.14	TBA810P	1.66	TDA3571B	3.08	UPC1363C	1.06
2SA872	0.14	2SD1138	0.94	AN5900	1.27	BC547A	0.04	BF245B	0.41	BUW81A	2.29	LA4270	2.73	R2540X	1.92	STK7308	4.99	TBA810S	0.66	TDA3576	11.90	UPC1363CA	2.13
2SA872A	0.20	2SD1207	0.35	AN6310	4.69	BC547B	0.11	BF255	0.11	BUW84	1.11	LA4282	2.37	R2M	0.77	STK7348	4.67	TBA820	0.85	TDA3640	4.75	UPC1365C	1.70
2SA940	0.82	2SD1265	0.77	AN6326	3.61	BC548A	0.29	BF256	0.24	BUX84	0.44	LA4422	1.27	R3297	4.27	STK7356	5.57	TBA820L	0.55	TDA3650	9.83	UPC1378H	1.19
2SA952	0.17	2SD1273	0.82	AN6341	2.29	BC548B	0.18	BF256LC	1.40	BUX85	0.60	LA4440	1.68	R4050	2.38	STK7358	5.46	TBA820M	0.34	TDA3653AQ	1.92	UPC1391H	0.52
2SA958	1.44	2SD1275	0.88	AN6610	0.93	BC548C	0.12	BF257	0.36	BUZ71	0.52	LA4445	1.29	R4051	2.95	STR1096	4.67	TBA920	0.51	TDA3653B	1.86	UPC1394	1.23
2SA966Y	0.41	2SD1276	0.85	AN6671K	5.35	BC549	0.06	BF258	0.04	BY127	0.15	LA4460	1.48	RB156	2.07	STR40090	6.80	TBA950	1.88	TDA3654	1.66	UPC1420CA	6.60
2SA970	0.19	2SD1279	7.62	AN7158	2.73	BC556B	0.06	BF259	0.31	BY133	0.08	LA4461	1.48	RGP15	0.41	STR4090	16.36	TBA970	4.08	TDA3810	2.55	UPC1488H	1.28
2SA984	0.27	2SD1292	0.41	AN7161	3.56	BC557	0.07	BF324	0.12	BY164	0.67	LA4475	2.29	RGP15J	0.35	STR4211	4.72	TCA270S	1.03	TDA4420	1.27	UPC2002	2.08
2SB1010	0.34	2SD1308	0.77	AN7171K	4.37	BC557B	0.06	BF337	0.34	BY179	0.80	LA4476	2.29	RGP30M	0.30	STR440	6.38	TCA440	1.95	TDA4427	1.89	UPC324C	1.74
2SB546	0.53	2SD1397	1.89	BA145	0.11	BC557C	0.11	BF338	0.43	BY184	0.39	LA4500	2.17	RM11C	0.68	STR441	6.27	TCA660B	0.43	TDA4442	3.49	UPC4558C	0.51
2SB633	0.93	2SD1398	2.13	BA156	0.06	BC558B	0.06	BF355	0.48	BY206	0.13	LA4505	1.79	S2000AF	1.19	STR451	14.68	TCA800Q	1.65	TDA4500	3.79	UPC574	1.07
2SB643S	0.20	2SD1426	2.54	BA157	0.07	BC559	0.11	BF392	0.23	BY207	0.18	LA4508	2.29	S2055AF	1.81	STR50020	9.02	TCA910	1.21	TDA4501	5.08	UPC580C	2.55
2SB644	0.34	2SD1427	2.89	BA158	0.07	BC560C	0.21	BF393	0.17	BY210400	0.19	LA4520	1.11	S2530A	1.98	STR50103	5.92	TCA940	3.40	TDA4503	3.38	UPD1937C	3.15
2SB688	1.28	2SD1432	4.88	BA159	0.25	BC635	0.19	BF422	0.19	BY224600	5.10	LA4700	3.81	SAA1004	1.14	STR54041	6.75	TD3F900H	6.57	TDA4505E	4.64	X0065CE	2.20
2SB772	0.43	2SD1439	3.05	BA317	0.19	BC637	0.15	BF423	0.14	BY226	0.16	LA5112	5.89	SAA1121	11.22	STR5412	8.27	TDA1004A	3.40	TDA4600	1.70	X2402	4.62
2SB772Q	0.43	2SD1453	1.87	BA318	0.04	BC639	0.14	BF435	1.97	BY227	0.14	LA5512	0.61	SAA1174	5.10	STR54041	6.35	TDA1011	1.27	TDA4600/2	2.14	ZPY120	9.17
2SB793	0.31	2SD1497-02	7.05	BA5102A	1.46	BC640	0.06	BF450	0.19	BY228	0.38	LA7223	2.54	SAA1250	2.92	STR6020	10.15	TDA1011A	1.47	TDA4600/2	3.54	ZTX650	0.51
2SB819	0.48	2SD1497-06	7.06	BA536	1.14	BC879	0.39	BF458	0.30	BY229	1.64	LA7520	2.75	SAA1251	5.74	STR6020KIT	11.23	TDA1013A	1.45	TDA4600F	1.70	ZTX753	1.01
2SB861	0.97	2SD1541	4.66	BA5406	2.12	BC880	0.38	BF459	0.29	BY229600	0.84	LA7800	1.44	SAA1351	8.23	T6064V	2.63	TDA1015	0.99	TDA4601	1.56		
2SB891	0.43	2SD1555	2.80	BA6109	1.85	BCY70	0.07	BF469	0.34	BY229800	1.02	LA7801	1.27	SAA3027P	7.62	T6076V	3.34	TDA1020	1.27	TDA4601D	2.42		
2SC1008	0.17	2SD1577	4.33	BA6209	1.31	BD131	0.28	BF470	0.33	BY238	0.31	LA7820	2.03	SAA5010	4.60	T9013V	5.23	TDA1035SB	4.15	TDA4605	3.64		
2SC1061	0.83	2SD1649	2.03	BA6219	1.45	BD132	0.21	BF480	0.67	BY255	0.14	LA7830	1.27	SAA5012	3.31	T9034V	1.45	TDA1035T	1.87	TDA4950	1.09		
2SC1096	0.50	2SD1650	2.47	BA6222	1.61	BD135	0.33	BF493S	0.34	BY298	0.15	LM1303N	0.88	SAA5030	6.42	T9035V	1.50	TDA1037	8.50	TDA7240A	2.36		
2SC1114	1.16	2SD1876	4.88	BA656N	0.84	BD136	0.20	BF597	0.16	BY299	0.12	LM1877	1.45	SAA5050	4.68	T9038V	6.09	TDA1044	1.43	TDA7270S	8.17		
2SC1162	0.31	2SD1877	2.12	BA718	0.77	BD137	0.45	BF757	0.43	BY476A	0.68	LM317T	0.52	SAB3013	5.81	T9053V	0.92	TDA1060	1.58	TDA8140	2.38		
2SC1213	0.14	2SD1911	5.06	BAS11	0.32	BD139	0.29	BF758	0.32	BYD14J	0.31	LM324N	0.35	SAB3021	6.15	T9054V	1.65	TDA1082	4.25	TDA8153	5.10		
2SC124	0.44	2SD234	0.89	BAV18	0.07	BD140	0.24	BF759	0.36	BYD33G	0.68	LM339N	0.15	SAB3035	6.35	T9064	1.20	TDA1083	1.19	TDA8170	2.58		
2SC1306	1.16	2SD313	0.56	BAV20	0.26	BD168	0.76	BF760	0.24	BYD33J	0.27	LM358	0.23	SAF1032P	5.50	T9065V	4.66	TDA1151	0.51	TDA8180	5.35		
2SC1318	0.10	2SD350A	1.23	BAV21	0.19	BD175	0.29	BF762	0.29	BYV10–40	2.20	LM358N	0.42	SAF1039	2.44	TA7063P	1.14	TDA1170	1.59	TDA8190	3.30		
2SC1364	0.29	2SD401	3.46	BAW62	0.17	BD179	0.34	BF869	0.25	BYV95C	0.44	LM380N	0.82	SDA2112	11.00	TA7122BP	0.63	TDA1170N	1.38	TDA9503	2.13		
2SC1384	0.34	2SD438	0.34	BAX14	0.28	BD189	0.41	BF870	0.23	BYV96D	0.27	LM393N	0.27	SG264A	10.62	TA7146P	7.70	TDA1170S	1.16	TEA1002	4.98		

OVER 10,000 DIFFERENT DEVICES IN STOCK

IF YOU DON'T SEE IT LISTED ASK FOR QUOTE. GIVE MAKE, MODEL, LOCATION. REMEMBER TO ADD £1.00 POST & HANDLING U.K. MAINLAND ONLY. HANDLING CHARGE TO ALL EXPORT ORDERS AT COST. ADD 17½% VAT TO TOTAL

USE YOUR ACCESS OR VISA ☎ TEL 0902 712083/773122 (24 HOURS)

AIWA
HV-6B

	Part No.	Price
Video Head	VID 2546	£15.34
Pinch Roller	VID 1755	£3.83
Belt Kit	VID 7519	£2.03
Idler Replacement Set	VID 1001	£3.65
Idler	VID 1005	£2.12
Capstan Motor	VID 2160	£25.00
Tension Band	VID 1423	£3.65
Reel Table Rubber Tyre	VID 1335	£1.19
CTL Unit	VID 2637	£61.55

AV-77

Video Head	VID 2546	£15.34
Pinch Roller	VID 1755	£3.83
Belt Kit	VID 7509	£1.33
Idler Replacement Set	VID 1000	£5.69
FWD Limiter	VID 1002	£3.83
Idler	VID 1004	£1.19
Idler	VID 1005	£2.12
Capstan Motor	VID 2118	£29.36
Tension Band	VID 1423	£3.65
CTL Unit	VID 2567	£47.83

AKAI
VS-J800

Video Head	VID 2511	£10.74
Pinch Roller	VID 1756	£3.23
Belt Kit	VID 7506	£1.78
Take Up Idler	VID 1025	£5.27
REW Idler	VID 1026	£6.71
FF Rubber Tyre	VID 1029	£0.85
FF Rubber Tyre	VID 1030	£0.85
Unloading Idler Rubber Tyre	VID 1207	£0.93
Capstan Motor	VID 2119	£25.34
Drum Motor	VID 2120	£20.20
Cassette Lamp	VID 1943	£0.35
Tension Band	VID 1391	£3.65
Repair Kit	VID 7911	£15.27
Take Up Rubber Tyre	VID 1028	£0.94

ALBA
VCR-4000

Video Head	VID 2713	£16.30
Pinch Roller	VID 1787	£3.43
Belt Kit	VID 7596	£3.81
Idler	VID 1049	£3.44
Cassette LED	VID 1981	£1.53
Tension Band	VID 1399	£2.04

AMSTRAD
VCR-4600

Video Head	VID 2676	£13.77
Pinch Roller	VID 1758	£3.15
Belt Kit	VID 7593	£1.75
Clutch	VID 1226	£4.76
Gear Holder	VID 1227	£13.14
RF Clutch	VID 1231	£7.78
Cassette LED	VID 1981	£1.53

VCR-9000

Video Head	VID 2502	£15.61
Pinch Roller	VID 1758	£3.15
Belt Kit	VID 7592	£1.19
RF Clutch	VID 1225	£4.33
Clutch	VID 1226	£4.76
Gear Holder	VID 1227	£13.14
Cassette LED	VID 1981	£1.53

BANG & OLUFSEN
VHS-65

Video Head	VID 2506	£14.14
Pinch Roller	VID 1788	£3.15
Belt Kit	VID 7538	£1.27
FF×REW Idler Arm	VID 1020	£1.79
Clutch Plate	VID 1211	£9.27
Capstan Motor	VID 2147	£23.15
Cassette LED	VID 1981	£1.53

DECCA
VHH-8300

Video Head	VID 2511	£10.74
Pinch Roller	VID 1814	£3.15
Belt Kit	VID 7812	£1.02
Reel Idler	VID 1036	£2.63
Take Up Clutch	VID 1037	£2.44
Take Up Idler	VID 1038	£1.29
Brake Pad	VID 1361	£0.59
Reel Motor	VID 2169	£28.97
Capstan Motor	VID 2164	£33.80
Loading Motor	VID 2168	£12.64
Cassette Lamp	VID 1947	£0.51
Tension Band	VID 1389	£1.44
Repair Kit	VID 7913	£16.09
Take Up Reel Table Rubber Tyre	VID 1080	£0.68
Supply Reel Table Rubber Tyre	VID 1080	£0.68

FERGUSON
3-V-30

Video Head	VID 2647	£9.18
Pinch Roller	VID 1814	£3.15
Belt Kit	VID 7812	£1.02
Reel Idler	VID 1036	£2.63
Take Up Clutch	VID 1037	£2.44
Take Up Idler	VID 1038	£1.29
Brake Pad	VID 1361	£0.59
Reel Motor	VID 2169	£28.97
Capstan Motor	VID 2164	£33.80
Loading Motor	VID 2168	£12.64
Cassette Lamp	VID 1947	£0.51
Tension Band	VID 1389	£1.44
Repair Kit	VID 7913	£16.09
Take Up Reel Table Rubber Tyre	VID 1080	£0.68
Supply Reel Table Rubber Tyre	VID 1080	£0.68

3-V-36

Video Head	VID 2647	£9.18
Pinch Roller	VID 1813	£3.15
Belt Kit	VID 7543	£1.16
Take Up Clutch	VID 1031	£2.26
Take Up Idler	VID 1038	£1.29
Reel Idler	VID 1039	£3.40
Brake Pad	VID 1361	£0.59
Capstan Motor	VID 2165	£25.16
Loading Motor	VID 2168	£12.64
Front Loading Motor	VID 2168	£12.64
Cassette LED	VID 1981	£1.53
Tension Band	VID 1389	£1.44
Remote Control	IR 9100	£11.01
Repair Kit	VID 7918	£12.51
Mains Transformer	VID 2223	£24.18
Take Up Reel Table Rubber Tyre	VID 1080	£0.68
Supply Reel Table Rubber Tyre	VID 1080	£0.68
Cassette Housing	VID 1099	£21.75

3-V-57

Video Head	VID 2573	£14.66
Pinch Roller	VID 1813	£3.15
Belt Kit	VID 7540	£0.68
Clutch Mechanism	VID 1083	£15.00
Capstan Motor	VID 2187	£45.96
Loading Motor	VID 2167	£14.11
Front Loading Motor	VID 2168	£12.64
Cassette LED	VID 1981	£1.53
Tension Band	VID 1388	£2.13
Repair Kit	VID 7920	£21.85
Cassette Housing	VID 1315	£21.90

3-V-57

Cassette LED		
Tension Band		
Take Up Reel Table		
Supply Reel Table		

FV-108

Video Head	VID 2580	£19.73
Pinch Roller	VID 1817	£5.50
Belt Kit	VID 7564	£1.81
Idler Arm	VID 1091	£3.18
Reel Motor	VID 2193	£16.24
Capstan Motor	VID 2190	£24.72
Loading Motor	VID 2412	£6.37
Front Loading Motor	VID 2412	£6.37
Cassette LED	VID 1981	£1.53
Tension Band	VID 1386	£0.85
Repair Kit	VID 7921	£9.97

FV-12L

Video Head	VID 2581	£30.88
Pinch Roller	VID 1817	£5.50
Belt Kit	VID 7564	£1.81
Idler Arm	VID 1091	£3.18
Reel Motor	VID 2193	£16.24
Capstan Motor	VID 2190	£24.72
Loading Motor	VID 2412	£6.37
Front Loading Motor	VID 2412	£6.37
Cassette LED	VID 1981	£1.53
Tension Band	VID 1386	£0.85
Repair Kit	VID 7921	£9.97

FIDELITY
VCR-100

Video Head	VID 2502	£15.61
Pinch Roller	VID 1758	£3.15
Belt Kit	VID 7593	£1.75
Clutch	VID 1226	£4.76
Gear Holder	VID 1227	£13.14
RF Clutch	VID 1231	£7.78
Cassette LED	VID 1981	£1.53

FINLUX
VR-1030

Video Head	VID 2558	£44.82
Pinch Roller	VID 1803	£3.83
Idler	VID 1006	£3.46
Tension Band	VID 1432	£5.87
Remote Control	IR 9034	£14.52
Repair Kit	VID 7930	£12.58

VR-2010

Video Head	VID 2578	£62.15
Pinch Roller	VID 1827	£5.70
Belt Kit	VID 7588	£1.09
Idler	VID 1252	£5.20
Loading Gear	VID 1253	£7.23
Modification Set	VID 1254	£10.61
Tension Band	VID 1431	£4.85
Remote Control	IR 9034	£14.52

FISHER
FVH-P520

Video Head	VID 2500	£17.39
Pinch Roller	VID 1788	£3.15
Belt Kit	VID 7532	£1.35
Take Up Idler	VID 1015	£3.65
FF×REW Pulley	VID 1016	£0.94
Idler	VID 1023	£3.20
Tension Band	VID 1378	£2.76
Take Up Reel Table Rubber Tyre	VID 1293	£0.77
Supply Reel Table Rubber Tyre	VID 1293	£0.77

FVH-P530

Video Head	VID 2500	£17.39
Pinch Roller	VID 1788	£3.15
Belt Kit	VID 7532	£1.35
Take Up Idler	VID 1015	£3.65
FF×REW Pulley	VID 1016	£0.94
Idler	VID 1023	£3.20
Tension Band	VID 1378	£2.76
Take Up Reel Table Rubber Tyre	VID 1293	£0.77
Supply Reel Table Rubber Tyre	VID 1293	£0.77

FVH-P720×720K×721

Video Head	VID 2500	£17.39
Pinch Roller	VID 1810	£3.04
Belt Kit	VID 7532	£1.35
Gear Idler	VID 1013	£4.51
Idler	VID 1014	£3.06
Loading Gear Set	VID 1230	£1.02
Cassette LED	VID 1981	£1.53
Tension Band	VID 1376	£2.38
Take Up Reel Table	VID 1295	£8.07
Supply Reel Table	VID 1294	£6.55

FVH-P722×725

Video Head	VID 2501	£28.57
Pinch Roller	VID 1810	£3.04
Belt Kit	VID 7813	£1.19
Gear Idler	VID 1013	£4.51
Idler	VID 1014	£3.06
Loading Gear Set	VID 1230	£1.02

HITACHI
VT-11

	Part No.	Price
VID 1981	£1.53	
VID 1376	£2.38	
VID 1295	£8.07	
Video Head		
Pinch Roller		

JVC
HR-3300

	Part No.	Price
Video Head	VID 2504	£15.84
Pinch Roller	VID 1788	£3.15

	Part No.	Price
VID 2511	£10.74	
VID 1756	£3.23	
Remote Control		
Repair Kit	VID 7919	£17.92
Cassette Housing	VID 1315	£21.90

IMPORTANT NOTICE

The green video comparison sheet is now out of date. We will continue to supply this document because it remains an invaluable reference in the workshop. It has become impracticable to update it due to the greatly increased amount of information now available. The video comparison database now installed in our computer contains

OVER 50,000 RECORDS

If you cannot find the part that you need in the green video comparison list, **PHONE NOW!!** The availability and cost will be given almost instantaneously

A REPLY IN A FEW SECONDS

More and more video repair engineers are turning firstly to *Economic Devices* to locate and supply those more obscure parts, and sooner or later rely on us for all their video part requirements.

We are confident that our video comparison database is the largest in the UK and its fast retrieval system makes ECONOMIC DEVICES a must for all your video parts.

ECONOMIC DEVICES, 32 Temple St., Wolverhampton WV2 4AN
Phone (0902) 773122 Fax (0902) 29052

FUNAI
VCR-4600

Video Head	VID 2596	£15.75
Pinch Roller	VID 1757	£3.13
Belt Kit	VID 7567	£0.85
Idler	VID 1052	£1.78
Idler	VID 1222	£1.57
Clutch	VID 1228	£2.29
Idler	VID 1440	£1.53
Gear Holder	VID 1981	£1.53
RF Clutch	VID 1400	£2.39
Cassette LED	IR 8965	£20.79

VCR-5843

Video Head	VID 2595	£16.24
Pinch Roller	VID 1821	£9.52
Belt Kit	VID 1482	£8.16
Gear Idler	VID 1482	£8.16
Idler	VID 1981	£1.53
Cassette LED	VID 1401	£0.00

HINARI
VXL-30×35×4

Video Head	VID 2518	£21.85
Pinch Roller	VID 1815	£3.15
Belt Kit	VID 7566	£2.38
Clutch	VID 1316	£6.21
Idler	VID 1317	£2.77
Loading Motor	VID 2167	£14.11
Cassette LED	VID 1981	£1.53

GEC
V-4004

Video Head		
Pinch Roller		
Belt Kit		
FF×REW Arm		
Clutch Plate		
Capstan Motor		
Cassette LED		
Tension Band		
Repair Kit		

GOLDSTAR
GHV-8000×8200×8210

Pinch Roller		
Belt Kit		
Idler		
Bracket Centre		
Clutch Gear		
Limiter Roller		
Cassette LED		
Tension Band		

VCP-4100×4130

Video Head		
Pinch Roller		
Belt Kit		
Idler		
Bracket Centre		
Clutch Gear		
Limiter Roller		
Cassette LED		
Tension Band		

VCP-4200×4326

Video Head		
Pinch Roller		
REW Belt		
Cassette LED		

GRANADA
VHS-ET1×ET2

Video Head		
Pinch Roller		
Belt Kit		
Reel Drive Unit		
Loading Gear A		
Loading Gear B		
Capstan Motor		
Cassette LED		
Tension Band		

GRUNDIG
MVS-400

Video Head	VID 2647	£9.18
Pinch Roller	VID 1814	£3.15
Belt Kit	VID 1482	£8.16
Roller Bar	VID 1363	£4.67
Brake Pad	VID 1361	£0.59
Reel Motor	VID 2169	£28.97
Capstan Motor	VID 2187	£47.57
Loading Motor	VID 2168	£12.64
Front Loading Motor	VID 2168	£12.64
Cassette Lamp	VID 1946	£0.59
Tension Band	VID 1389	£1.44
Repair Kit	VID 7914	£13.42
Take Up Reel Table Rubber Tyre	VID 1080	£0.68
Supply Reel Table Rubber Tyre	VID 1080	£0.68

VS-520 GB

Video Head	VID 2647	£9.18
Pinch Roller	VID 1814	£3.15
Timing Belt	VID 1482	£8.16
Centre Pulley	VID 1482	£8.16
Cassette LED	VID 1981	£1.53
Tension Band	VID 1401	£0.00

H-895

Video Head	VID 2514	£35.50
Pinch Roller	VID 1813	£3.15
Belt Kit	VID 7540	£0.68
Clutch Mechanism	VID 1082	£15.84
Capstan Motor	VID 2166	£53.24
Loading Motor	VID 2167	£14.11
Front Loading Motor	VID 2168	£12.64
Cassette LED	VID 1981	£1.53
Tension Band	VID 1387	£2.55

Take Up Clutch	VID 1031	£2.26
Take Up Idler	VID 1038	£1.29
Reel Idler	VID 1039	£3.40
Brake Pad	VID 1361	£0.59
Capstan Motor	VID 2165	£25.16
Loading Motor	VID 2168	£12.64
Front Loading Motor	VID 2168	£12.64
Cassette LED	VID 1981	£1.53
Tension Band	VID 1389	£1.44
Repair Kit	VID 7918	£12.51
Mains Transformer	VID 2223	£24.18
Take Up Reel Table Rubber Tyre	VID 1080	£0.68
Supply Reel Table Rubber Tyre	VID 1080	£0.68
Cassette Housing	VID 1099	£21.75

SALORA
SV-8620

Pinch Roller	VID 1808	£3.15
Belt Kit	VID 7600	£3.31
FF×REW Idler Arm	VID 1233	£3.66
FF×REW Idler Arm	VID 1234	£3.51
FF×REW Idler	VID 1235	£1.97
Cassette LED	VID 1981	£1.53
Tension Band	VID 1394	£3.64
Take Up Reel Table	VID 1308	£5.37
Supply Reel Table	VID 1305	£4.67

SAMSUNG
VI-510×520×611×616×621

Video Head	VID 2648	£17.88
Pinch Roller	VID 1815	£3.15
Belt Kit	VID 7598	£1.40
Idler	VID 1232	£1.53
Idler	VID 1346	£2.81
Reel Motor	VID 2407	£15.77
Capstan Motor	VID 2409	£29.25
Loading Motor	VID 2142	£16.70
Cassette LED	VID 1981	£1.53

VX-710×720×730

Video Head	VID 2648	£17.88
Pinch Roller	VID 1759	£3.06
Belt Kit	VID 7608	£2.72
Cassette LED	VID 1981	£1.53

SANYO
VHR-1100 EX×EE×G

Video Head	VID 2583	£22.68
Pinch Roller	VID 1787	£3.43
Belt Kit	VID 7558	£1.27
Reel Drive Roller	VID 1076	£6.18
Reel Motor	VID 2198	£15.87
Cassette LED	VID 1981	£1.53
Tension Band	VID 1411	£2.72

VHR-1500 EX×G

Video Head	VID 2585	£32.50
Pinch Roller	VID 1787	£3.43
Belt Kit	VID 7558	£1.27
Reel Drive Roller	VID 1076	£6.18
Reel Motor	VID 2198	£15.87
Cassette LED	VID 1981	£1.53
Tension Band	VID 1411	£2.72

VTC-M10×11×20×21

Video Head	VID 2530	£20.45
Pinch Roller	VID 1758	£3.15
Belt Kit	VID 7809	£0.77
Reel Drive Pulley	VID 1079	£7.05
Idler	VID 1219	£2.02
Reel Motor	VID 2179	£20.44
Tension Band	VID 1408	£2.13
Supply Reel Table	VID 1319	£9.77

SENTRA
VX-5000×8000

Video Head	VID 2713	£16.30
Pinch Roller	VID 1787	£3.43
Belt Kit	VID 7596	£3.81
Idler	VID 1049	£3.44
Cassette LED	VID 1981	£1.53
Tension Band	VID 1399	£2.04

	Part No.	Price
Remote Control	IR 8947	£14.80
Repair Kit	VID 7919	£17.92
Cassette Housing	VID 1315	£21.90

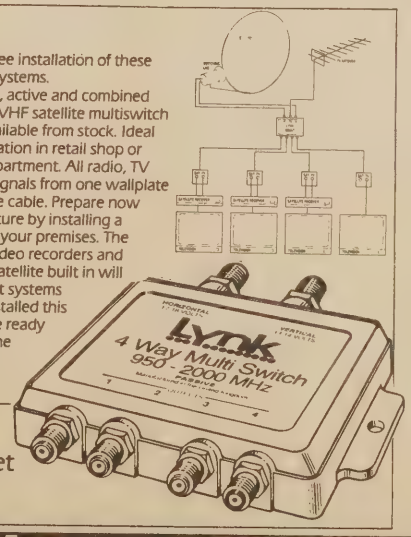
We Supply **Lynk**

I.F. DISTRIBUTION PRODUCTS FOR SATELLITE TV

I.F. Distribution has the advantage over other traditional distribution systems in that each room or dwelling has it's own receiver/decoder which can receive all channels as if it had it's own independent dish.

Lynk supply a range of products to enable simple, trouble free installation of these types of systems.

Passive, active and combined FM/UHF/VHF satellite multiswitch boxes available from stock. Ideal for installation in retail shop or repair department. All radio, TV satellite signals from one wallplate down one cable. Prepare now for the future by installing a system in your premises. The sales of video recorders and TV with satellite built in will soar. Most systems will be installed this way so be ready to meet the demand.



Send a self addressed envelope for 13 page booklet and price lists.

WE GUARANTEE THAT ALL VIDEO SPARES SUPPLIED BY US ARE OF THE FINEST QUALITY AND THAT ALL STOCKED ITEMS WILL BE DISPATCHED THE SAME DAY.

10,000 Line Catalogue available with order, or by request. SAE please (9" × 4").
Prices quoted are subject to stock availability and may be changed without notice.
Orders from Govt. Institutions, Schools Nationals etc., accepted with official order

TRADE COUNTER OPEN DAILY 9am-5pm — FAX NUMBER: 0902-29052

TV Fault Finding

Reports from Philip Blundell, AMIEIE, Brian Storm, Edward Joyce , J.G.Grieve, Michael Dranfield, John Edwards, Richard Flowerday, John Hepworth, and Terry Lamoon

Philips GR1-AX Chassis

With most Philips chassis the h.t. supply to the line output stage is removed when the scan coils plug is disconnected. Beware! On some versions of the GR1-AX chassis this is not the case. I was caught out by a set that was dead with a whistling noise coming from the power supply. A resistance check across the 95V supply reservoir capacitor C2660 produced a reading of 600Ω. I figured that removing the scan coils plug should have disconnected the line output stage so, as the leak was still there, I chased around the power supply for a while. Finally I resorted to following the 600Ω leak along the print and ended up at the line output transformer, not the scan coils plug as I would have expected. All that was wrong was a leaky BUT11AF line output transistor. Fitting a new one and attending to some dry-joints in the line driver stage got things working again. **P.B.**

Philips 2A Chassis

If the power supply is slow to start check whether R3670 still reads 33Ω. When its resistance value goes high the power supply takes a few seconds to start. **P.B.**

Grundig Cinema 9050

There was a fault with the screen drive motor in this projection set – in this model the screen rises up out of the cabinet like Reginald Dixon at the Tower Ballroom! Usually when you switch the set on the channel display appears, the screen rises then the line timebase starts up. With this set however the channel display appeared, the screen began to rise, then the display went to standby and the screen weent down again. If you held the mains switch down the screen would move up jerkily with the channel display constantly going from 1 to standby.

The set has to be out of standby for the screen to rise. A check showed that the out-of-standby signal from the tuning board was pulsing when it should have been steady. The tuning board is powered by a mains transformer, rectifier and regulator. There was 1V of 50Hz ripple on the output from this arrangement. The regulator is on the Omniplatte (convergence etc.) board. As the rectifier D6013 is a full-wave type there shouldn't have been a 50Hz ripple. Resistance checks on the transformer solved the problem: one half was open-circuit because of a dry-joint where the leads are soldered to the mains fuse board. **P.B.**

Panasonic TC1485 (Z3 Chassis)

Intermittently dead faults are not exactly my favourites. So it was with a heavy heart that I lifted this portable on to the work bench. To start with the set worked perfectly. Subsequently it lapsed into an inoperative state. A check showed that there was no power-on signal from the system microcontroller chip IC1101, but further checks in this area revived the set which continued to work faultlessly all day. Next day the set couldn't be prodded into life. Everything appeared to be fine except that IC1101's reset line seemed to be slightly lower than usual. Suspicion then fell on a small yellow component, C1122 (0·01μF), which proved to be leaky. A replacement restored reliable operation. **B.S.**

Samsung CI5013T (P58SC Chassis)

If one of these sets won't start, with no standby light, or possibly trips check R811 (100kΩ) which tends to go high in value. It's connected to pin 8 of the TDA4601 chopper control chip. **E.J.**

Hitachi CPT2044/46/48

If the field size varies or there's field collapse, replace the 1μF capacitor C603 – it's a blue tantalum type! **E.J.**

Philips GR1-AX Chassis

A fault you sometimes get with these sets is no go with the standby LED flashing after a few seconds. If the cause is not the line output transistor it could be the 15V zener diode D6613. **E.J.**

Ferguson 59M5 (ICC5 Chassis)

The picture looked as though the tube's emission was low: it lacked blue until the brightness was turned up, when blue flared across the picture. We found that RV73 (47kΩ, 1W), the d.c. feedback resistor in the blue output stage, had risen to a very high value. **E.J.**

Ferguson B14C (TX90 Chassis)

No sound has become a common fault with these sets. Fusible resistor R509 (1·8Ω) goes open-circuit or high in value. Note that this is the Thomson, not the earlier TX90 chassis. **E.J.**

Panasonic TX21T1 (Alpha 2 Chassis)

The fault with one of these sets was that the picture went red after a short while in operation. We checked this and that and froze everything on the c.r.t. base panel, none of which helped. It turned out that a disc ceramic capacitor, C353 (220pF), was going leaky. It decouples the emitter of the red output transistor. **E.J.**

Ferguson ICC7 Chassis

If the set is dead but not tripping you'll probably find that RP62 (0·1Ω) is open-circuit and the BA157 rectifier diode DL09 short-circuit. DL09 takes its feed from the line output transformer, generating the 65V supply across CL09. RP62 is in the chopper circuit. **E.J.**

Philips CTX Chassis

There was an off-tune, slightly distorted picture with buzz on sound, higher channels being worse. Teletext consisted

of garbled gobbledegook. The scan tuning wouldn't lock, though you could use the fine tuning. The cause of the trouble on this occasion was a leaky capacitor within i.f. transformer 5158. It's best to replace the whole can. Don't be tempted to tweak cores: this may appear to help, but the teletext doesn't like the result. **J.G.G.**

Osaki P10R

This set was dead but there were no blown fuses. The cause of the fault was no output from the 12V regulator IC402, a big, square block. I fitted the Nikkai AL2711K and all was well during a long test run. The set is similar to the **Nikkai Baby 10.** **J.G.G.**

Sony KV2212

This set was permanently in the search tuning mode. When we removed the back we saw that the channel search button was stuck down. A call to our Sony dealer friend proved to be fruitful. He didn't have the switch but provided us with the part number and recommended replacement of all ten pushbuttons on this panel to prevent further trouble. When we removed the panel we found that six of the buttons were stuck down. The Sony part no. is 1-552-774-00. **M.Dr.**

NEI 2131

There was sound but no vision, just a blank raster. A scope check showed that the amplitude of the sandcastle pulse at pin 8 of the TDA3561A colour decoder chip was low. The cause was traced to the TDA3653 field output chip (pin 7). Replacing this restored the video information. **M.Dr.**

Toshiba 2100TBT

This set would develop a ripple on the picture. It got worse as the set warmed up. Many tins of freezer, much heating with a hairdryer and extensive component replacement failed to cure the problem. We eventually found that connecting a 2·2µF, 63V capacitor between the tuner's VT pin and chassis cleared the effect. Solder the capacitor as close to the VT pin as possible. **M.Dr.**

Osume CTV1486T

When it was warm this set would keep flicking between the picture and teletext. In addition text characters would intermittently flash up on the screen. We found that the expensive SAA5243P/E VIP chip on the teletext PCB was running very hot. As its supply voltage was correct we replaced the chip, curing the fault. **M.Dr.**

Philips CF1 Chassis

One of these sets had several fault symptoms – no line or field sync, no sound output and flyback lines across the entire screen. The culprit was the TDA2577A sync/timebase generator chip. We had a TDA2577 in stock but when this was fitted there was normal sound but field collapse, so the A suffix is obviously important. **J.E.**

Finlux 1632

There was excessive width, severe EW bowing and the EW amplitude and width controls had no effect. We found that inductor Lz4 was badly dry-jointed at one end, where there were burn marks on the PCB around the joint, Rz26 (10kΩ) was open-circuit and the BD241A EW modulator driver transistor Tx4 was short-circuit base-to-emitter. **J.E.**

Hitachi CPT2278 (NP83CQ-2 Chassis)

One of these sets screamed at me until I disconnected pins 6 and 10 of the line output transformer. This stopped the screaming and restored the correct h.t. output from the power supply, thus proving that the transformer had failed. **J.E.**

Logik 4090/Ferguson TX90 Chassis

A corrugated ripple effect on all vertical contents of the picture could be reduced by lowering the brightness or contrast level, i.e. the beam current. The cause of the fault was C189 (22µF, 50V) which when checked measured only 0·5µF **J.E.**

Solavox 22R09/ITT CVC1215 Chassis

The job card said "bang then dead". When you get this look no farther than C701 (10µF, 350V) which explodes. It's quite a common fault. **J.E.**

Bush 2520

It took several attempts before this set would switch on. We found that the positive temperature coefficient thermistor R802 in the power supply was dry-jointed while R800 (820kΩ) read just under 2MΩ. When these components had been replaced the set started up with no further problems.

Another of these sets suffered from low-gain, noisy reception, as if the tuner had failed. The cause of the fault was the TDA4505 chip IC100 however. **J.E.**

Matsui 2180TT/Saisho FST212T

This set was dead. The mains bridge rectifier was providing a supply for the STR58041 chip in the power supply but the latter provided no output. A new chip plus mica washer and heatsink compound got the set going. **J.E.**

Goodmans 2043T

The power supply was working, providing the correct h.t. voltage at pin 17 of the chopper transformer, but the set remained lifeless because there was no h.t. at the B+ terminal of the line output transformer. Diode D8035 was open-circuit. **J.E.**

Panasonic TC21M1R (Z4 Chassis)

Intermittent field collapse was the fault with this set. It appeared at random and didn't seem to be affected by time or temperature. Must be a capacitor, we thought! When the fault was present the trigger input at pin 2 of the field output chip IC451 was missing. In addition the voltage at this pin rose to 5·8V.

Attention was turned to the field oscillator, which is part of the video processor chip IC601 on board C. Although the voltages here were correct there was no ramp waveform at pin 34, to which the oscillator's timing components are connected. The culprit was the 3·3µF tantalum capacitor C402. Remember – beware of blue tants! **R.F.**

Ferguson A51F (ICC7 Chassis)

One of these sets would very intermittently revert to the

standby mode. The customer said that "it went off every five minutes", but it took over a week of soak testing for the problem to show up in the workshop. When it did, we found that the line oscillator's supply at pin 40 of IV01 was missing, though the voltage at the power control pin of the microcontroller chip IR01 was low – the correct state for a running set. Attention was turned to the standby switching transistors TR16/17. The latter turned out to be open-circuit, though freezing it brought the set back to life. A replacement transistor cured what was an extremely vexing problem.

Incidentally TR18 is not to be found in the set though it's shown in the circuit diagram. **R.F.**

Akura CX26

Although this set would produce stereo sound with a Nicam broadcast there was no f.m. sound with video playback at r.f., nor from a test pattern generator. There was plenty of demodulated f.m. sound at pin 5 of the i.f. chip IC101, but this disappeared into the Nicam board, where all the audio switching takes place, and didn't come out again. Swapping parts with another set proved that the EEPROM chip IC002 was responsible, though we couldn't work out why! When changing this chip much time can be saved by first going into the service mode and noting the various adjustment levels. **R.F.**

Bush 2814T

I had no service manual for this Turkish manufactured set, which had no e.h.t. and no tube heater supply. Fortunately it didn't take long to establish that R603 (3·9kΩ, 5W) was open-circuit. It's in the h.t. feed to the line driver stage. Be warned: replacing the back on these sets would try the patience of a saint! **J.H.**

JVC CX500ME

This is a multi-standard 5in. colour set with a radio and a cassette player section. The radio and tape sections worked but the TV section was dead. When TV was selected the voltage from the power supply fell to 4V. Disconnecting various things proved to be fruitless. The cause of the fault was a high-resistance section of the function selector switch. **J.H.**

Hitachi C25-P819 (G7P Mk II Chassis)

These sets are in the Images range of FST models. Failure to start usually means that one or more of the following resistors has gone high in value or open-circuit: R931 (150kΩ), R932 (120kΩ), R919 and R920 (both 100kΩ). If one of them goes only 20-30kΩ high it can cause intermittent starting. These resistors are connected in series pairs to pins 4 and 5 of the TDA4601 chopper control chip. **J.H.**

Mitsubishi Euro 4 Chassis

This set's memory, which is an EAROM, wasn't working. Following the usual practice, the chip operates with a –30V supply. We found that this supply was missing because of an open-circuit winding on transformer T951 (pins 1 and 4). **J.H.**

Pioneer SV2102

This was the first Pioneer TV set I've come across. There was e.h.t. but no sound or vision. The chassis is rather a daunting sight and the set weighed a ton. I decided to phone Pioneer for advice and was told to replace an i.c., type U4606 (they didn't give the circuit reference number, mind). Doing this cured the fault, but take note: if you order the chip from SEME you'll find that it is reasonably priced in the general spares list, but if you use the Pioneer part number you'll need a mortgage to pay for it. **J.H.**

Matsui 1455

The problem with this set was field collapse, though the output stage seemed to be working normally. Checks around the jungle chip were inconclusive and a replacement made no difference. So it was back to the driver and output stages. The power supply arrangement here is a bit unusual. By making cold checks I eventually found that the 10Ω safety resistor R310, which acts as a surge limiter, was open-circuit. This stopped the driver stage working. **T.L.**

ITT TX3126 (Monoprint B Chassis)

At switch on this set would trip, with a momentary display. I decided to check the outputs from the power supply and found that the 16V line showed no signs of life at switch on. The reason for this was that the 1,000µF reservoir capacitor C715 was short-circuit. Make sure you use the correct capacitance value – if it's too high it will hold the set off after an initial switch on, as I found out. **T.L.**

Matsui 1466

There was no sound or vision with this portable set, though the channel indicator was working. I went straight to the regular culprit with this model, R502 (330kΩ) in the power supply. It goes high in value. Fitting a replacement restored normal operation. **T.L.**

Mitsubishi CT25M1TX

When this set was switched on there was virtually no contrast in the display and flyback lines were present. A check on the voltages around IC251 produced a reading of 1·2V instead of 2·9V at pin 7. On tracing the supply back to Q704 I found that the 12V line was very low. When tested Q704 turned out to be leaky, a replacement restoring a perfect display. **T.L.**

Matsui 2160

If the fault is no sound or picture with normal channel change lights, check the output from the STR58041 chopper chip IC501. If this is missing fit a replacement. **T.L.**

Ferguson 51P7 (TX98 Chassis)

This set was brought in with the complaint that the channels would change on their own, the sound would mute and the text would do odd things. We had it on test for several days without any fault putting in an appearance, but the customer insisted that it was faulty. So we phoned a Ferguson expert who suggested an answer. All you have to do is to cut the print at pin 11 of the infra-red preamplifier chip and add an 0·1µF capacitor across the cut. This was done and the set was sent back, never to return. So the modification worked. If it doesn't you replace the tube base. **T.L.**

Camcorner

Reports from David C. Woodnott and Keith T. Keeton

Amstrad VMC100

For no colour check the 2SC3929 transistor Q517 on the camera PCB. It buffers the chroma signal feed to the deck section. **D.C.W.**

Ferguson FC07

This JVC-designed camcorder had no camera E-E picture. A common cause of this symptom (a blank white viewfinder screen) is lock-up of the microcontroller chip: removing then refitting the clock battery normally provides a cure. Not so this time! On inspection we found that the iris remained closed – pictures were obtained when the iris mechanism was manually operated. The cause of the fault was traced to D4 on the IMG SSG panel. It was open-circuit. In fact this glass-type diode was literally shattered. An interesting point is that it's shown in the manual as a chip component.

No cause for the failure of this component could be found and a replacement provided a complete cure. The diode's physical position on the PCB puts it in contact with the rear edge of the deck mechanism. It seems possible that a knock to the optical block could produce a mechanical shock that was transferred to the D4 area, cracking the glass. **D.C.W.**

Panasonic NVMS2

The problem with this camcorder was incorrect white balance. We traced the cause to poor soldering at P001 on the camera operation PCB. **D.C.W.**

Sony CCDF250

The reported fault was "viewfinder and E-E camera pictures disappear after a few minutes' use". Sure enough they did! We traced the camera picture signals, both Y and C, through to the output pins of the encoder chip IC606 on board CV9. At this point they are applied to a Y/C mixing and buffering circuit consisting of Q602, Q617 and Q619, a composite video signal appearing at the emitter of Q619. This signal disappeared intermittently, causing the fault symptom.

The Y/C mixer stages are direct coupled, and voltage checks here showed that the d.c. conditions varied wildly. Static checks and the replacement of several components in this area didn't help. The voltages at the pin connections varied even when the three transistors were removed from the board! Sabotage was suspected. . . The cause of the problem turned out to be a 120µF, 6·3V electrolytic capacitor (C704) that decouples the 5V rail. It had leaked over part of the print in the Y/C mixer section. I suppose the moral is that if odd symptoms that defy logic persist, look for a leaky capacitor. **D.C.W.**

Amstrad VMC100

The fault report with this point-and-shoot model said "no functions with the cassette housing open". We found that CP403 and the 9·6V regulator transistor Q402 on the main PCB were both open-circuit. We checked for shorts then fitted replacement components. This provided a cure – until eject was pressed. CP403 then failed, but this time Q402 was all right. As no likely cause could be discovered CP403 was replaced, a tape was loaded and a recording was started. Everything was o.k., even when eject was pressed: the recordings were found to be o.k. when checked in a playback machine. But after much soak testing CP403 again failed while the machine was in the eject mode.

In sheer desperation I dismantled the unit once more and connected an analogue ammeter in series with CP403. Tape loading was achieved without mishap, but when the eject button was pressed the ammeter showed that there was an excessively heavy overload, far in excess of normal. The cause of the trouble was finally traced to the loading motor, which was going short-circuit to chassis intermittently, thus explaining why the fault occurred only in the eject mode. **D.C.W.**

Sony V900

These camcorders are very reliable and are easy to fix once they are opened up, but a very large number of patch leads are required. Once you are able to power the machine the assembly looks like spaghetti. Repair is not a job for the beginner. We've had the following faults:

(1) There was playback/recording for a few seconds, then a warning symbol appeared. We found that in fast forward the take-up reel didn't move while the clutch was slipping. A new take-up reel restored correct operation.

(2) There were horizontal stripes on the playback picture. We found that the tape path couldn't be adjusted. There was a faulty tape guide, a new roller assembly putting matters right.

(3) The LCD was o.k. but there was no power to the camera/VCR section, with the electronic viewfinder dead. Checks around IC101 on board FD10P showed that the 5V supply was present at pin 54, there was oscillation at pins 55/58 but the VTR power-on output didn't go low. IC101 was faulty, a replacement restoring normal operation. This is a fairly common fault. **K.T.K.**

Sony V700

Here are a couple of faults we've had with this model:

(1) There was no playback picture (black screen) and no sound. Checks showed that the 5V PB supply was low at 1·5V. The cause was transistor Q280 (type 2SC4081R, part no. 872990535).

(2) No playback picture (black screen) but this time the sound was o.k. Checks showed that there was an input signal at pin 41 of IC650, which turned out to be faulty. It's type CXA1207R (part no. 875203619). **K.T.K.**

Long-distance Television

Roger Bunney

This column first appeared over thirty years ago, when the magazine was called *Practical Television*. It was initially written by Charles Rafarel, who carried out much research on long-distance television reception techniques in the early days. When Charles died in 1971 I was asked to take over and have written the column ever since. The aim has been to carry on in the way that Charles would have approved – describing experimentation and innovation and providing news.

There have been rapid advances in reception technology over the last twenty years. These include solid-state receivers, the varicap tuner and improved ways of resolving weak signals. At the same time it has become much easier to obtain suitable equipment. Thus receiver modification, the norm in the Sixties, is no longer necessary. The ATS-6 SITE experiment in 1975/6 gave us the first chance to sample satellite TV reception: reports on the success of several enthusiasts in receiving these weak signals were reported in this column. V.H.F. TV in the UK is now but a memory: Bands I and III are at present wastelands of PMR, baby alarms and other 'officially sanctioned' intruders despite being allocated as broadcast bands in Europe. Along with these developments, DXing has also changed. We have to exploit new TV signal reception possibilities as they arise.

Satellite TV is now an established and growing consumer market. Satellites offer a mass of TV and radio programmes, video feeds of various sorts and news links that can be received using simple equipment and aerials. You don't need massive aerials on tall masts, simply a clear view of the sky from the south east through to the south west. Many DX enthusiasts are now monitoring the various satellite bands and birds. This may not be true DX, being line-of-sight rather than over-the-horizon, but there is much of a DX nature to see and with the weaker signals DX techniques still apply.

From next month I intend to include satellite loggings, with a view to encouraging readers to investigate the various signals that can be received; also to provide information on the equipment required, with the emphasis on practical and inexpensive ways of satellite DXing. Our terrestrial DX-TV coverage will of course continue, and readers letters will as always be welcome. If you do write to tell us about satellite receptions, please mention the equipment being used.

November was a very quiet month for conventional DX reception. There were a few Sporadic E signals, a couple of auroral events and one day of exceptional tropospheric reception – and that was about it! No reports have come in of reception as a result of the Leonids meteor shower. The collated SpE log is as follows:

6/11/93	TVE (Spain) chs. E2, 3, 4; RAI (Italy) chs. IA, B; TVA (Italy) ch. IA.
7/11/93	+PTT (Switzerland) E2, 3, 4; RAI IA.
8/11/93	TVE E2, 3, 4.
13/11/93	DR (Denmark) E3; TVE E2.
15/11/93	DR E3; TVE E2.
20/11/93	NRK (Norway) E3.
27/11/93	TVE E2; RAI IA; +PTT E2.

Iain Manzies logged auroral events on the nights of the 14th and 19th, with signal 'manifestations' in Band I.

There was an excellent tropospheric lift on the 8th, with signals from ARD (Germany), DR/TV2 (Denmark) and SVT1/2/TV4 stations (Sweden) in Band III and at u.h.f. More exotic signals were logged by Simon Hamer in Powys, including TVP1 (Poland) ch. R8 and YLE (Finland) ch. E6. Two extremely good catches in an otherwise dull month.

My thanks to Iain Menzies (Aberdeen), Simon Hamer (Powys), Roger Fussell (Torpoint), Brian Williams (Penarth) and Peter Schubert (Rainham) for sending in reports.

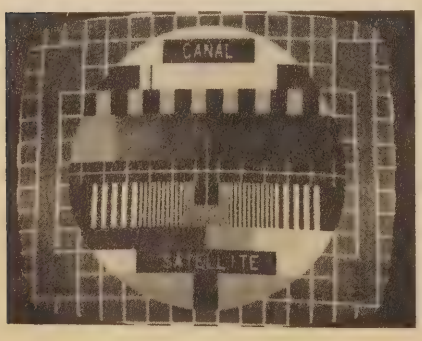
News Items

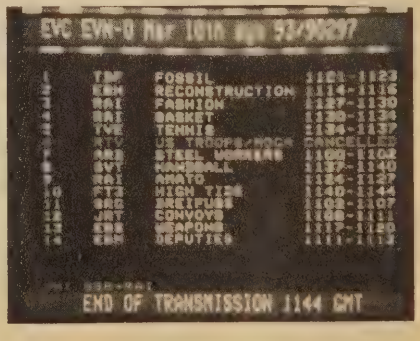
Ireland: A new Gaelic language TV channel, Telefis na Gaeilge, will come on air during 1994 with three hours of programmes a day to start with.

UK: The ITC is offering a local delivery licence, as the cable franchises are now called, for the west Kent area, including Tonbridge, Tunbridge Wells and Sevenoaks. Use of both cable and broadcast transmission is envisaged. For the latter a 40MHz bandwidth in the 40GHz band will be allocated – though no equipment for this is currently available.

India: Doordashan is currently transmitting five channels via Insat 2B, but most viewers remain tuned to Star TV from Hong Kong via AsiaSat 1. To encourage viewing the five-channel Doordashan service will be duplicated via terrestrial transmitters in the main urban areas: low-power transmitters are to be installated in Calcutta, Madras, Bombay and Delhi using channels E5, 7, 23, 26 and 29.

Zambia: Independent radio and TV transmission licences are to be issued – bids were to be received by the end of 1993. Radio stations will use Band II, with f.m.





Left: Canal Satellite from Telecom 2B at 5°W. Signals from this satellite are easy to receive in the southern UK with a 60-80cm dish. Centre: Nile TV, a new Egyptian channel transmitted via Eutelsat II F3 at 16°E. Reception by Andrew Sykes in Halifax, using a standard Pace receiver and an 80cm dish. Right: Another photograph from Andrew Sykes, showing a typical news feed menu transmitted by the EBU, usually via Eutelsat II F4 at 7°E. Items come from various European broadcasters.

Belgium: Because of severe financial problems RTBF is curtailing its contributions to the ARTE channel.
Malta: The authorities have made strong complaints about the use of their allocated u.h.f. channels, 21 and 29, by Italian stations. An unlicensed Maltese station, Super One Television, has been carrying out tests on ch. E43.
Poland: The satellite channel Polsat has been given a ten-year licence for terrestrial broadcasting throughout the country.

Transmitter Updates

Belgium: Liege ch. E39 e.r.p. increased to 315kW, ch. E42 reduced to 500kW.
France: The following stations are now in operation. Avignon TDF-3 ch. E33, TDF-6 ch. E36, both 55kW e.r.p.; Saint Raphael TDF-5 ch. E36 80kW e.r.p.; Caen TDF-6 ch. E61, TDF-5 ch. E64, both 100kW e.r.p. All with horizontal polarisation.
Belgium: ARTE-21 transmissions, Leglise ch. E11 10kW, Liege ch. E42 500kW, Profondeville ch. E49 200kW, Anderlues ch. E61 200kW. Sports-21 transmissions, Wavre ch. E28 500kW, Leglise ch. E60 200kW, Tournai ch. E63 20kW (vertical). AFN-TV transmissions, Everberg ch. E33 2kW, Casteau-Shape ch. E34 4·5kW (vertical). Canal Plus transmissions, Liege ch. E39 315kW, Wavre ch. E50 500kW, Anderlues ch. E58 200kW. ARTE-21 programmes are scrambled from 1900 local time. Canal Plus transmissions are scrambled all the time.

Our thanks to the EBU and the BDXC for the above information.

Meteor Showers 1994

Many thanks to Neil Bone, Director of the Meteor Section, the British Astronomical Association, for providing the dates of the main meteor showers during 1994 and the related notes as follows:

Lyrids shower April 19-25th, peaking on the 22nd.
May Aquarids May 1st-20th, peaking on the 5th.
Cetids May 7th-June 10th, peaking May 14-25th.
Delta Aquarids July 15th-August 20th, peaking August 1st.
Perseids July 25th-August 20th, peaking August 11-12th.
Giacobinids – little activity expected this year.
Orionids October 16-27th, peaking on the 20-22nd.
Taurids November 1st-30th, peaking on the 3rd-8th.
Leonids November 15-20th, peaking on the 17-18th.
Geminids December 7-15th, peaking on the 13th.

The Quadrantids shower occurred in early January. The most active showers are the Quadrantids, Perseids and Geminids. In recent years the Perseids have provided a double peak (August 11-12 and 12-13th), associated with the return of the parent comet. Activity is moderate with the May Aquarids and Orionids. Leonids are uncertain: outbursts every 33 years suggest that 1998/9 will produce a major shower, with the preceding years showing enhanced activity. There is activity at six-yearly intervals with the Giacobinids, 1998 being the next date. The other showers listed produce low but steady activity.

Satellite TV

Once a sought after station TV Shqiptar, Albania will be an every-day signal now that the Albanians have signed a one-year lease for transponder facilities aboard Eutelsat II F3 at 16°E. Another new channel at 16°E is Quorum Satellite Network, which has been transmitting captions. Frequency is 11·163GHz with horizontal polarisation. This business programme is uplinked from London.

There have been suggestions of overheating problems with Astra 1A, leading to transponder allocation reshuffles and power reductions with some downlinks. There were stability problems with this satellite in the early days and it is possible that its estimated life will be shortened.

Singapore Television International has commenced operation in the Far East as a rival to Star TV.

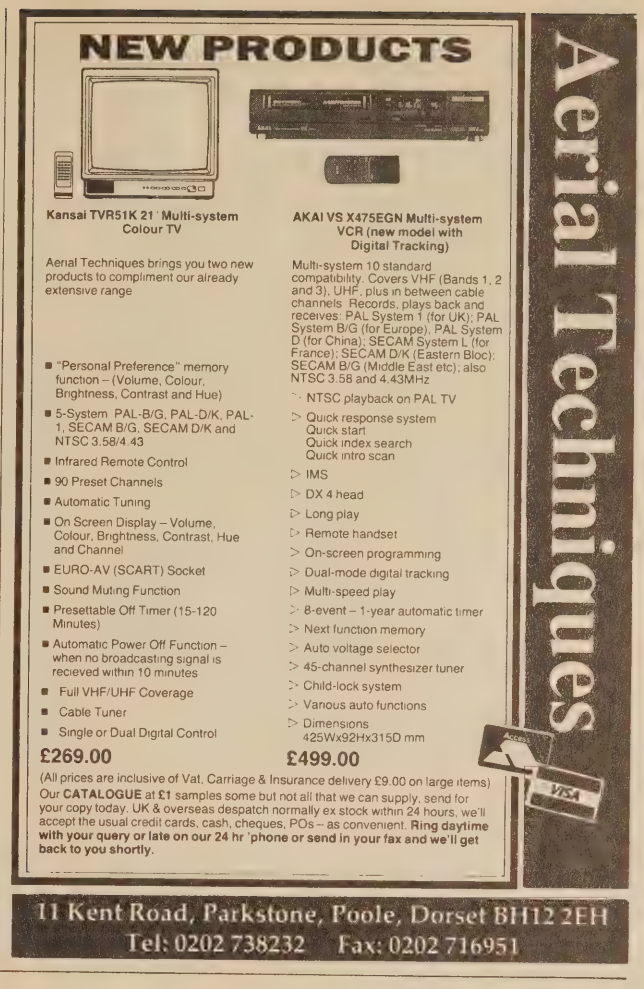
Peace at last over the dispute about the satellite slot at 78·5°E. The Thaicom-1 satellite is to occupy this position while Asiasat-2 will be at 100·5°E. The back-up Thaicom-2 satellite will also be at 78·5°E.

Eutelsat II F5 should now be in orbit at 36°E with 16 Ku band transponders while the elderly Eutelsat I F1 is to be moved to either 36° or 50°E to give greater coverage of the Middle East and Central Russia.

An interesting fault condition has occurred on Intelsat 601 at 27·5°W. The C band Canal France International service for Africa is also present at 11·155GHz, the old CNNI transponder, presumably because of a defect in the cross-strapping circuitry. The signal is not strong but with care can be clearly seen.

TV wars are breaking out across France: in conjunction with Canal Plus, Tele Monte Carlo is offering a programme package to compete with the offerings of the RTL (CLT) group. The latter has wheeled out RTL-TV, RTL+ and RTL2/3/5 as complementary channels to compete with the TMC/Canal Plus package. Talks are understood to be in progress between the competing parties.

Finally NKM, a German company, has just introduced a



STICKING CD?

EURAS SYSTEM IS THE COMPACT ANSWER

CD technology is changing fast. New models get introduced with alarming regularity, each with the latest enhancement. So it's not surprising to find models and faults you've not encountered before.

The problem is you can spend costly, unchargeable time searching for elusive faults, which is where Euras System can help.

The Euras System is Europe's largest repair tips database for Video, Television and CD.

With over 120,000 repair tips for 14,000 models from 270 manufacturers you are sure to find the solution quickly. And because it is frequently updated, it always covers the latest models.

For a FREE demonstration diskette to run on your PC or details of Euras System in manual form, clip the coupon or phone **0272 860900.**

EURAS INTERNATIONAL LTD
EURAS HOUSE, 51 BRISTOL ROAD,
KEYNSHAM, BRISTOL, BS18 2BA

TV 2/94 D

EURAS

Solutions at your fingertips

PLEASE SEND ME A FREE DEMONSTRATION DISKETTE ☐
PLEASE SEND ME DETAILS OF EURAS SYSTEM IN MANUAL FORM ☐

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

_____

_____ POSTCODE _____

All the satellite information you'll ever need is through this window ...

The professional's satellite TV system analysis software by D J Stephenson

Satmaster Pro for Windows

requires IBM PC compatible 286/386/486 with MS-DOS, Windows 3.1 and 2MB hard disk space.

Only £99 (plus post)

- ✔ Allows you to design a system and test its performance *before* you install it!
- ✔ Generates tables of essential setup 'look angles' for fixed or motorised dishes at ***any*** location in the world for existing and future satellites!
- ✔ Calculates full link budgets using auto dish optimisation for best quality pictures, taking into account circular or linear polarisation!
- ✔ Work with multiple link budgets on screen simultaneously! Ideal for designing systems to work in a variety of widely spaced locations!
- ✔ Calculates Cross Polar Discrimination (XPD) and path dependent effects such as atmospheric absorption by water and oxygen!
- ✔ Display maps of magnetic variation, CCIR rain-climatic zones, water vapour densities and mean surface temperatures! Or add your own!
- ✔ Add worldwide satellite footprint graphics!
- ✔ Easy-to-use Windows interface makes tedious tasks simple and quick for everyone!
- ✔ Print professional looking reports, graphs and tables to any Windows compatible printer!
- ✔ Includes text editor so you can add your own project notes, equipment lists etc! Cut and paste information between MS-DOS and other Windows software!
- ✔ 20,000 word Hypertext technical guide with fault-finding, cable specs and site survey guide - you can even add your own notes!
- ✔ Display maps, graphs, tables and link budgets simultaneously - Includes footprint graphics for all popular satellites across Europe!
- ✔ Draws beamwidth and lobe patterns so you can judge potential interference from neighbouring satellites!
- ✔ Calculates accurate rain fade margins for any

*Be professional! ... order new **Satmaster Pro for Windows** today!*

Swift Television Publications

17 Pittsfield, Cricklade, Wilts SN6 6AN England Tel 44 (0)793 750620 Fax 44 (0)793 752399

Please send me copies of ***Satmaster Pro for Windows*** @ £99 each
Postage £1 in UK, Europe add £2, Rest of World £4.
I enclose cheque/PO for £ payable to Swift Television Publications
or please debit my Mastercard/Visa credit card:
Number: _____
Expires: _____

Name: _____
Address: _____

PAYS-U.T.V.

SUPPLIERS OF WORKING USED TV'S, VIDEOS, MICROWAVES, FRIDGE FREEZERS, COOKERS + WASHING MACHINES

TEL: NOTTINGHAM 0602-500002

WE DELIVER ALL AREAS!

PHONE FOR DETAILS

Access VISA

18 BROOKWOOD ROAD, SOUTHFIELDS, LONDON SW18 5BP

TEL: 081-877 3492/877 3518 FAX: 081-877 3518

A Z ELECTRICS

BELT KITS

A range of belt kits in stock from 60p to £2.40. Makes for most models available including: Alba, Akai, Amstrad, Ferguson/JVC, Fisher, Funai, GEC, Goldstar, Granada, Grundig, Hinari, Hitachi, Mitsubishi, NEC, Orion, Panasonic, Philips, Saisho, Samsung, Sanyo, Schneider, Sharp, Sony, Tensai, etc – Please state model and make.

VIDEO MOTORS

A range of **Reel Motors** made by Ferguson, Hitachi, Sanyo, Sharp & Panasonic are available, please state model and make.

We stock **capston motors,** makes include Ferguson/JVC, Hitachi and Sharp.

Also available are Ferguson **Mode Control Motors,** please state make, model.

Mode Motor Assembly 3V35-49 at £12.50

Sharp Reel Motor Pulley only £1.20

Replacement of plastic pulley on a number of Sharp Reel Motors with the above metal pulley gives better rewind/FF performance.

REMOTE CONTROLS

Bush, Ferguson, Grundig, ITT, Philips, Pye, Sony, Hitachi, Matsui, Logik, Panasonic, Saisho, Salora, Samsung, Tashiko, Tatung, Toshiba. Various models TV & Video .... **From £10.00**

MANY HITACHI TV REMOTE CONTROLS NOW IN STOCK.

STATE MODEL FOR PRICE.

One for all Mk 3, 4, 6, ... **From £18.50**
Toptel Universal R/C £28.00
Fox £22.50

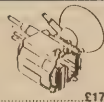
TRIPLERS

Universal Tripler £6.20
Universal Tripler with focus unit £9.50
Decca 120/130 series tripler £8.50
Thorn TX10 Focus Unit Kit .... **This month only SPECIAL OFFER £5.00**
Grundig Trips .... **POA**

MAINTENANCE KITS

Available for Alba, Amstrad, Ferguson, Fisher, Goldstar, Goodmans, Granada, Hinar, Hitachi, JVC, Matsui, Mitsubishi, Nikkai, Panasonic, Philips, Saisho, Salora, Schneider, Sentra, Sharp, Sony, Tashiko, Toshiba.

LINE OUTPUT TRANSFORMERS



LOPT Hitachi 2174,76,78 .... £17.50
LOPT Hitachi CPT1476 .... £18.00
LOPT Hitachi CPT2276 etc £19.00
LOPT Matsui 1440 .... £18.00
LOPT Matsui 1450 .... £22.00
Decca 100 .... £9.50
ITT CVC25/30/32 .... £9.50
ITT Compact 80 Series 110 .... £16.75
ITT Compact 80 Series 90 .... £19.75
ITT CVC1204 .... £11.50
ITT CVC800/1/3 .... £21.50
ITT CVC1100 .... £16.50
ITT CVC1150/1175 .... £20.00

Wide range of Panasonic LOBTS now available. Please ask for more details

Other ITT transformers available

Fidelity all models up to 20" ZX3000 .... £15.50
Fidelity Panel for ZX2000 .... £1.00
Fidelity 22" ZX3000 .... £18.50
Hinari CT4/5 & TVA1 .... £17.50
Philips KT3 .... £12.95
Thorn TX100 Green Spot 110 .... £14.50
Ferguson TX90 LOPT specify size screen £17.75
Sony – Please state model for price

VIDEO HEADS

AMSTRAD, FERGUSON, HITACHI, PANASONIC, SANYO, SHARP, FISHER, HINARI, ALBA, MITSUBISHI, ORION, SAISHO, SAMSUNG, TOSHIBA. State Model No. Price from £7.50

PINCH ROLLERS

A range of Pinch Rollers is in stock, most of them @ **£2.80.** Makes include Akai, Amstrad, Ferguson, Fisher, Funai, GEC, Goldstar, Grundig, Hinari, Hitachi, ITT, JVC, Marantz, Mitsubishi, NEC, Nordmende, Orion, Panasonic, Philips, Samsung, Sanyo, Schneider, Sharp, Sony, Tensai, Thomson, Toshiba etc. Please state model and make.

Philips Pinch Roller for models VR6180, 6185, 6285, 6362, 6367, 6467, 6468, 6470, 6561, 6670, 6760, 6761, 6870 .... £6.00

BACK-UP BATTERIES

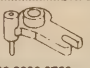
Philips 1.2V Back up Battery £1.75
Philips 2.4V Back up Battery £2.80
Ferguson TX10 .... £2.00
Ferguson TX10 1.2 .... £2.10
Ferguson TX10 2.4 .... £3.58
5.5V Back Up Cap £1.85

TV ON/OFF SWITCHES

ITT, Philips, Decca, Thorn, Fidelity, Grundig, Sony and Hitachi. State model for price.

SONY PUSH SWITCH 80p

Limiter Post Assembly £1.75



Makes & Models: Hinari VXL4, Matsui VX730,735,735A,755, 770,800A,810,820,880,990. Saisho VR1100,1200,1200HQ, 1600,2500,3200,3300,3300X, 3500,3600,3700

OTHER SPARES

Universal Video Copying Kit £4.25
Universal Copying Kit (Scart) £5.20
Universal Camcorder Kit £8.00
Video Cassette Lamps from £0.50
CRT Anode Caps £0.60
Video Tape Splicing Kit £6.95
Hitachi TV Frame Module HM6251 .... £8.00
Hitachi TV Frame Module HM6232 .... £10.50
Cassette Loading Roller Assembly 3V23,3V31,3V32 .... £4.50
Degaussing Positor Blue £4.00
Degaussing Positor White £1.30
Degaussing Positor Hitachi £3.40
Degaussing Positor Philips £3.00
End Sensor for Hitachi VT63,64,65 (Pair) £2.75
Cassette LED Sensor for Panasonic etc £1.60
I.C. Circuit Protectors £0.60
Clear Service Cassette £5.90
Video Idlers Spring Kit £7.50
Video Washer & E Clip Kit £6.00
Universal Video head Puller .... From £7.90
Akai VS22 Series Power Board £26.00
Soldering Iron 25W £9.50
Multimeter .... From £11.50
Panasonic G Deck Technical Guide Video £14.50

CASSETTE HOUSING

Cass. Carriage 3V35 .... £25.50
Cass. Carriage 3V42 .... £25.50
Cass. Carriage 3V58, 59, FV11 .... £21.00
Cass. Carriage HRD 500, 30, 700, FV10, 12 ... £22.50
Cass. Carriage HIT. VT 11 .... £15.00
Cass. Carriage HIT. VT 64 .... £19.50
Cass. Carriage Philips VR6462 .... £16.85
Cass. Carriage Philips VR6362 .... £11.00
Akai Carr. Kit £10.25

MANY OTHER VIDEO AND TV SPARES IN STOCK

Back Tension Bands in Stock for Akai, Fisher, Hitachi, Ferguson, JVC, Mitsubishi, Panasonic, Sanyo and Sharp.

IDLER ASSEMBLY

FERGUSON, FISHER, HITACHI PHILIPS, PANASONIC, SANYO, SHARP, AKAI, SAMSUNG, MITSUBISHI, NEC, In Stock.

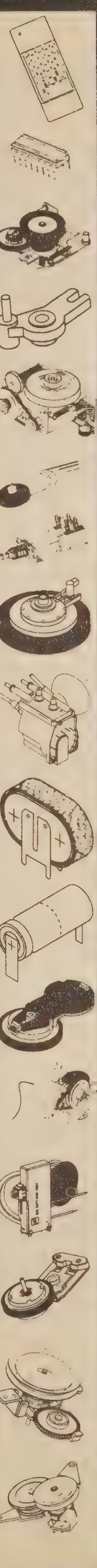
Price on Application **Wide Range Available**

L18205 . . . SCART SWITCHING UNIT. At the push of a button it is now possible to link your AV & audio systems together via the commonly used Scart sockets. No more unplugging, just a simple push-button operation allowing recording & playback of up to five different appliances **£14.50**

SATTELITE SPARES

SATT DISHES, LNBs, CABLES, SATT FINDER KITS, INSTALLATION KITS, etc NOW IN STOCK

0.9 DB £39.50
Special Offer 1.2 DB £29.00
Dual LNB both outputs H/V £52.00
63cm Dish £19.75
80cm Dish £39.50
100cm Dish £69.00
Other items in stock .... P.O.A.
35cm Sat. Dish comp with wall mount brkt £19.95



Prices subject to change without notice. Please add £1.25 per order for p&p and then add 17.5% VAT.

POSTAGE VARIES ON HEAVY ITEMS. SEND A4 SAE FOR LIST

INTEGRATED CIRCUITS

- AN103 £1.60
- AN214Q £2.50
- AN240P £1.30
- AN253P £1.80
- AN3821K £7.00
- AN3822 £7.50
- AN5015 £3.30
- AN5033 £5.00
- AN5132 £3.95
- AN5265 £1.35
- AN5510 £4.50
- AN5512 £2.00
- AN5521 £3.50
- AN5730 £3.20
- AN5750 £2.50
- AN5760 £2.00
- AN5900 £1.50
- AN6326 £4.00
- AN6332 £4.40
- AN6341 £2.75
- AN6344 £6.50
- AN6346 £4.50
- AN6346 £4.50
- AN6359 £5.50
- AN6360 £3.75
- AN6362 £4.25
- AN6387 £5.50
- AN6612 £2.20
- AN6651 £0.60
- AN6671K £5.50
- AN6677 £5.70
- AN6884 £2.75
- AN6912 £2.00
- AN7111 £1.50
- AN7112 £3.00
- AN7116 £1.20
- AN7143 £2.20
- AN7148 £1.70
- AN7158 £4.00
- CNX62A £1.50
- AN7160 £6.00
- AN7169 £3.50
- AN7171K £4.50
- AN7205 £1.95
- AN7213 £1.10
- AN7218 £1.20
- AN7220 £1.60
- AN7222 £2.10
- AN7223 £7.60
- AN7224 £1.40
- AN7225 £1.90
- AN7273 £2.00
- AN7310 £1.10
- AN7311 £1.75
- AN7315 £1.75
- AN7324 £4.50
- AN7410 £2.10
- AN7415 £1.40
- AN7420 £3.20
- AN7818F £1.60
- B1403 £1.00
- BA1320 £1.50
- BA1332 £1.00
- BA301B £1.50
- BA318 £2.50
- BA328 £1.10
- BA3308 £2.10
- BA333 £1.40
- BA3416L £2.75
- BA343 £1.30
- BA3505F £2.75
- BA3704 £2.75
- BA4210 £2.50
- BA4220 £2.00
- BA4236 £1.50
- BA4402 £1.00
- BA4403 £2.75
- BA5102 £2.45
- BA5204 £2.75
- BA524 £3.00
- BA5402 £2.40
- BA5406 £2.50
- BA6104 £2.50
- BA6109 £1.80
- BA6124 £2.75
- BA6154 £2.50
- BA6208 £2.75
- BA6209 £3.20
- BA6219 £1.85
- BA6222 £3.10
- BA6229 £1.85
- BA6238A £1.95
- BA6239 £3.75
- BA6259 £3.00
- BA6301 £2.00
- BA6302A £2.10
- BA6304 £1.70
- BA6305 £1.75
- BA681 £0.90
- BA7001 £1.90
- BA718 £1.80
- BA728 £1.10
- BA7767S £5.00
- BTT6018 £3.50
- CNX62A £3.50
- HA11215A £3.50
- HA11223 £3.75
- HA11225 £2.10
- HA11226 £3.75
- HA11235 £3.10
- HA11124A £1.75
- HA11414 £2.50
- HA11701 £3.10
- HA11713 £8.90
- HA11714 £3.50
- HA11715 £3.20
- HA11747A £12.75
- HA11749 £7.00
- HA11750 £3.50
- HA12005 £3.80
- HA12017 £2.00
- HA12026 £2.00
- HA2413 £1.20
- HA13001 £1.80
- HA13402 £8.20
- HA13403 £4.00
- HA1350 £9.00
- HA1368R £2.55
- HA1374 £6.00
- HA1377 £2.00
- HA1388 £4.00
- HA1392 £3.00
- HA1394 £4.00
- HA1397 £5.40
- HA1398 £3.50
- HA1406 £2.00
- HA1457 £2.10
- HA4219 £2.70
- HD14081 £0.25
- HD4539 £0.70
- KA2210 £2.30
- L7805 £0.80
- L7806 £0.80
- L7808 £0.80
- L7812 £1.00
- L7815 £0.80
- L7818 £0.80
- L7824 £0.95
- L7905 £0.80
- L7912 £0.80
- L7915 £0.80
- L7918 £0.80
- L7924 £0.80
- LA1180 £2.60
- LA1185 £2.60
- LA1201 £0.95
- LA1235 £2.50
- LA1260 £1.75
- LA1403 £3.75
- LA3160 £1.90
- LA3210 £1.90
- LA3220 £1.00
- LA3350 £1.50
- LA3361 £1.50
- LA3600 £1.50
- LA3700 £2.50
- LA4100 £1.90
- LA4102 £1.20
- LA4125 £5.50
- LA4140 £0.70
- LA4160 £1.25
- LA4182 £2.10
- LA4183 £2.75
- LA4192 £1.70
- LA4422 £1.30
- LA4440 £2.70
- LA4445 £2.50
- LA4460 £1.70
- LA4461 £1.80
- LA4500 £2.70
- LA4570 £2.20
- LA5522 £2.20
- LA5527 £1.95
- LA6358 £1.00
- LA7016 £2.50
- LA7096 £4.00
- LA7210 £3.10
- LA7305 £6.90
- LA7309 £3.75
- LA7507 £4.00
- LA7520 £3.25
- LA7800 £1.50
- LA7801 £1.50
- LA7820 £1.90
- LA7830 £2.50
- LA7913 £1.30
- LM1011N £3.00
- LM1017/M192B1 £2.30
- LM1035 £5.75
- LM1036N £3.70
- LM1112CN £3.30
- LM13600 £5.00
- LM1868N £1.50
- LM1894N £5.75
- LM317T £1.00
- LM324 £0.80
- LM339 £0.80
- LM339N £0.75
- LM384 £3.60
- LM386N £0.80
- LM556CN8 £2.50
- LM6402G-2003 £10.00
- LM641 £1.80
- LM748CN 8 PIN £1.25
- LM748N £2.00
- M104 £7.00
- M293B1 £15.00
- M490BB1 £14.50
- M491B/BB1 £11.50
- M50127AP £6.00
- M50453-012P £6.20
- M50560-01P £2.70
- M51014L £1.95
- M51164 £1.40
- M51356P £5.00
- M51381P £1.50
- M51393 £4.25
- M51513 £10.00
- M51515L £3.10
- M51516 £4.00
- M51903L £3.50
- M5213L £3.10
- M52184 £1.00
- M52314 £1.10
- M54519P £1.00
- M54543 £1.75
- M54544L £3.50
- M54548L £4.50
- M58478P £4.75
- M58655P £6.50
- M58839 £8.00
- M708 £5.50
- M709 £4.75
- MA150-E £2.20
- MB3106 £1.00
- MB3730 £2.75
- MB3731 £3.25
- MC13002P £5.00
- MC1310 £1.25
- MC1330P £2.95
- MC14001BCP £1.10
- MC14093B £1.50
- MC14426P £2.50
- MC14429P £2.20
- MC14497P £5.50
- MC14516BCP £2.00
- MC1458/UPC1458 £1.95
- MC3359 £1.10
- MCU2632 £1.90
- MEA2050 £4.60
- MEA2901 £3.00
- MH27316 £3.00
- ML232B £4.50
- ML237 (BTT6018) £3.50
- ML238B £7.50
- ML923 £5.50
- ML923DP £4.50
- ML926 £4.20
- MM314APL £1.75
- MM53108N £1.25
- MM5387 £2.90
- MM5402 £1.50
- MM5405N £3.50
- MM5456 £2.25
- MM5457N £2.50
- MM5458N £2.50
- MM55108 £2.65
- MM7317 £3.75
- MM74C901 £1.10
- MPD4011C £2.00
- MPD4069C £1.10
- MPD4081 £1.10
- MPD4514BC £5.00
- MPD5521066 £11.00
- MSL9378RS £3.50
- SAA1006 £2.50
- SAA1025 £5.80
- SAA1124 £3.95
- SAA1174 £6.50
- SAA1250 £4.00
- SAA1251 £8.50
- SAA1276 £4.50
- SAA1290-02 £10.70
- SAA1293-02 £8.00
- SAA1293-03 £5.70
- SAA3027 £5.00
- SAA5000 £7.50
- SAA5010 £5.80
- SAA5012 £5.00
- SAA5020 £5.80
- SAA5030 £8.00
- SAA5040A £3.50
- SAA5040B £3.50
- SAA5041 £9.50
- SAA5050 £7.00
- SAA5231 £9.00
- SAB3013 £5.77
- SAB3037 £11.00
- SAF1032P £6.00
- SAF1039P £2.00
- SAS560 £3.50
- SAS570 £3.00
- SAS580 £3.50
- SAS590 £3.50
- SL1430 £2.80
- SL1431 £1.60
- SL1432 £2.00
- SL471DP £2.20
- SL480 £3.30
- SL490 £3.00
- SL901B £3.00
- SL917B £4.00
- SN76670N £1.25
- SSA1075 £5.90
- SSA1250 £3.50
- ST082 £12.00
- ST1195 £5.50
- STA401A £3.75
- STA441C £3.00
- STK0029 £4.30
- STK043 £15.00
- STK082 £12.00
- STK2029 £8.50
- STK2125 £10.00
- STK2250 £9.20
- STK3041 £5.70
- STK40090 £8.00
- STK4121 II £8.75
- STK4141 II £7.90
- STK4142 II £10.00
- STK4151 £11.50
- STK4171 II £12.00
- STK430 £6.00
- STK4311 £10.20
- STK433 £7.50
- STK435 £8.00
- STK4352 £5.80
- STK437 £12.00
- STK4392 £7.00
- STK441 £10.50
- STK459 £11.00
- STK461 £10.50
- STK463 £12.00
- STK465 £12.00
- STK5315 £7.50
- STK5322 £6.50
- STK5325 £5.50
- STK5331 £3.75
- STK5332 £3.50
- STK5333 £6.00
- STK5338 £6.00
- STK5339 £4.00
- STK5361 £6.25
- STK5421 £6.50
- STK5422 £6.00
- STK5434 £6.50
- STK5451 £5.50
- STK5471 £5.25
- STK5476 £6.00
- STK5481 £5.00
- STK5482 £5.20
- STK5720 £7.00
- STK5730 £5.25
- STK6962 £3.20
- STK6972 £6.00
- STK7216 £6.10
- STK7308 £5.75
- STK7309 £5.30
- STK7348 £5.00
- STK7356 £6.50
- STK7358 £6.50
- STK7728 £5.30
- STR1096 £4.00
- STR3125 £5.50
- STR4090 £16.00
- STR40090 £8.00
- STR4211 £5.95
- STR440 £6.50
- STR441 £8.50
- STR451 £15.00
- STR454 £4.85
- STR50020 £7.90
- STR50103A £5.50
- STR5412 £5.95
- STR58041 £6.75
- STR6020 £6.50
- TA4180 £3.00
- TA4193 £5.00
- TA4194 £5.50
- TA4301 £4.50
- TA4345 £3.40
- TA4350 £6.00
- TA7120 £1.25
- TA7137 £1.25
- TA7176 £2.50
- TA7176AP £2.40
- TA7193AP £6.00
- TA7193P £6.00
- TA7205 £1.75
- TA7205AP £2.50
- TA7222 £2.25
- TA7223 £2.50
- TA7227P £2.30
- TA7230P £1.65
- TA7232P £1.50
- TA7233P £2.10
- TA7240 £3.00
- TA7241 £2.50
- TA7241AP £3.00
- TA7243 £3.30
- TA7245 £4.50
- TA7267P £2.80
- TA7270P £2.50
- TA7271P £3.25
- TA7274 £2.60
- TA7280P £3.00
- TA7281P £3.00
- TA7299P £3.00
- TA7302 £1.30
- TA7303 £1.10
- TA7310 £1.75
- TA7312 £1.75
- TA7313 £0.90
- TA7313AP £1.40
- TA7314 £2.00
- TA7323 £3.25
- TA7325 £2.00
- TA7325P £1.50
- TA7328 £2.00
- TA7335 £1.50
- TA7335P £4.20
- TA7342 £2.10
- TA7343 £1.75
- TA7350 £2.10
- TA7358 £1.50
- TA7607 £3.50
- TA7607AP £2.40
- TA7609P £2.70
- TA7614 £2.50
- TA7628P £2.40
- TA7629 £4.00
- TA7629P £2.75
- TA7630P £2.00
- TA7640 £2.00
- TA7658 £2.00
- TA7668 £2.00
- TA7680 £4.80
- TA7681AP £5.75
- TA7687 £2.00
- TA7698A £6.85
- TA7698AP £7.50
- TA7705P £1.50
- TA7709 £2.50
- TA7738 £2.50
- TA78L010P £1.75
- TA8101N £4.25
- TA8102P £4.25
- TA8644 £5.50
- TAA310A £2.00
- TAA550 £2.10
- TBA120S £0.50
- TBA530 £1.50
- TBA560 £1.60
- TBA750Q £4.20
- TBA800 £0.85
- TBA820M £0.45
- TBA920S £1.50
- TCA640 £3.75
- TCA650 £3.95
- TCA660B £3.50
- TDA1005 £2.70
- TDA1010A £1.30
- TDA1011 £1.20
- TDA1013 £2.60
- TDA1013A £1.90
- TDA1015 £1.20
- TDA1020 £2.50
- TDA1022P £4.50
- TDA1035 £1.90
- TDA1035T £1.90
- TDA1037 £7.90
- TDA1044 £2.50
- TDA1044U £1.50
- TDA1057 £2.00
- TDA1082 £3.50
- TDA1083 £1.70
- TDA1151 £1.50
- TDA1154 £2.70
- TDA1170S £1.50
- TDA1180 £1.80
- TDA1180P £3.00
- TDA1190 £1.90
- TDA1270M £4.10
- TDA1365 £4.90
- TDA1412 £1.00
- TDA1470 £5.00
- TDA1501A £3.20
- TDA1506 £8.50
- TDA1510 £3.20
- TDA1510A £3.20
- TDA1512 £3.75
- TDA1515A £2.50
- TDA1520 £3.95
- TDA1522 £1.50
- TDA1670A £3.00
- TDA1701 £4.00
- TDA1770A £3.00
- TDA1870A £2.60
- TDA1905 £1.40
- TDA1908A £2.25
- TDA1940 £2.80
- TDA1950 £2.50
- TDA2002 £1.40
- TDA2003 £1.30
- TDA2004 £1.70
- TDA2005 £1.70
- TDA2005S £2.95
- TDA2006V £1.85
- TDA2020 £2.90
- TDA2030 £1.10
- TDA2030H £2.00
- TDA2030V £1.75
- TDA2040 £2.80
- TDA2151 £5.50
- TDA2161 £3.50
- TDA2170 £3.25
- TDA2270 £2.20
- TDA2320 £0.90
- TDA2510 £5.00
- TDA2521/3 £9.75
- TDA2522Q £10.75
- TDA2530Q £6.00
- TDA2532 £3.00
- TDA2532Q £3.00
- TDA2540 £2.75
- TDA2541 £2.00
- TDA2543 £5.25
- TDA2560 £3.75
- TDA2600 £6.80
- TDA2576A £6.00
- TDA2578 £3.00
- TDA2578A £3.80
- TDA2579 £3.50
- TDA2581Q £8.00
- TDA2582 £2.55
- TDA2590 £2.25
- TDA2591 £2.70
- TDA2593 £1.50
- TDA2594 £3.00
- TDA2611A £2.00
- TDA2640Q £4.50
- TDA2653A £3.50
- TDA2822 £2.00
- TDA3190 £0.95
- TDA3303 £7.50
- TDA3330 £9.50
- TDA3540 £4.00
- TDA3541 £2.25
- TDA3560 £5.00
- TDA3561A £5.00
- TDA3562A £5.00
- TDA3565 £3.00
- TDA3571BQ £9.52
- TDA3590 £6.00
- TDA3651 £3.00
- TDA3651AQ £6.50
- TDA3653 £3.00
- TDA3654 £2.80
- TDA3810 £2.90
- TDA3950 £3.00
- TDA440 £2.00
- TDA4420 £2.45
- TDA4422 £3.95
- TDA4500 £3.80
- TDA4501 £5.80
- TDA4503 £4.50
- TDA4505 £6.75
- TDA4510 £4.40
- TDA4600 £2.60
- TDA4600-2 £2.60
- TDA4601 £2.10
- TDA4610 £4.50
- TDA5101 £2.00
- TDA7250 £6.00
- TDA7606AP £2.40
- TDA8180 £6.00
- TDA8190 £3.80
- TDA8341 £5.50
- TDA9503 £3.00
- TDA9513 £2.95
- TEA1009 £2.00
- TEA1014 £2.00
- TEA1039 £2.00
- TEA2018 £2.10
- TEA2018A £2.10
- TEA5101 £6.00
- TL011CP £2.00
- TL072CP £2.00
- TMM 2114AP £5.75
- TMS1944AN2L £2.00
- TMS1952 £2.50
- TMS1956 £2.30
- TMS1965NL £2.00
- TMS3450 £4.50
- TMS3615 £1.75
- U410B £1.60
- U416B £1.60
- UA767PC £1.20
- UA78/10 £2.00
- UA78M15 £2.00
- UAA1008DP £2.00
- UC38445 £5.00
- UPC1185H2 £5.00
- UPC1225H £3.75
- UPC1230 £3.00
- UPC1238V £2.10
- UPC1263 £3.00
- UPC1288V £5.00
- UPC1361C £3.90
- UPC1362C £4.50
- UPC1363 £1.90
- UPC1365 £4.50
- UPC1377C £3.50
- UPC1378H £2.00
- UPC1379 £2.20
- UPC1382 £1.50
- UPC1394 £1.70
- UPC1420A £7.00
- UPC1458 £1.95
- UPC1513HA £2.00
- UPC1520CA £2.48
- UPC339C £0.70
- UPD4011 £1.75
- UPD4066 £1.95

TRANSISTORS

- 2N3773 £1.90
- 2SA1095 £5.50
- 2SA1102 £1.90
- 2SA1112 £0.95
- 2SA1124 £0.35
- 2SA1220 £1.10
- 2SA1386 £4.70
- 2SA564 £0.40
- 2SA673 £0.20
- 2SA942 £0.35
- 2SA985 £0.95
- 2SB1016 £1.50
- 2SB772 £0.40
- 2SB775 £1.60
- 2SB819 £0.55
- 2SB965 £2.30
- 2SC1413A £2.50
- 2SC1826 £1.80
- 2SC1942 £5.50
- 2SC1983 £1.30
- 2SC2003 £0.25
- 2SC2027 £4.50
- 2SC2230 £0.50
- 2SC2238 £0.75
- 2SC2331 £1.00
- 2SC2335 £1.50
- 2SC2531 £0.26
- 2SC2564 £3.04
- 2SC2570 £0.55
- 2SC2577 £1.50
- 2SC2592 £0.95
- 2SC2621 £1.25
- 2SC2631 £0.30
- 2SC2632 £0.30
- 2SC2655 £0.60
- 2SC2958 £2.58
- 2SC2979 £3.00
- 2SC3153 £3.40
- 2SC3402 £0.40
- 2SC3519 £4.80
- 2SC3678 £2.70
- 2SC3715 £4.80
- 2SC458 £0.20
- 2SC789 £2.50
- 2SD1047 £2.75
- 2SD1051 £0.85
- 2SD1128 £1.50
- 2SD1138 £0.85
- 2SD1159 £0.75
- 2SD1207 £0.75
- 2SD1273 £1.00
- 2SD1275 £1.30
- 2SD1288 £1.70
- 2SD138 £0.85
- 2SD1391 £4.20
- SDC1397 £3.75
- 2SD1398 £2.25
- 2SD1426 £4.50
- 2SD1432 £5.00
- 2SD1453 £1.60
- 2SD1455/2SD1730 £3.10
- 2SD1496 £4.00
- 2SD1497 £2.60
- 2SD1497-02 £5.85
- 2SD1497-06 £5.95
- 2SD1650 £3.50
- 2SD1877 £2.30
- 2SD639 £0.35
- 2SD667 £1.00
- 2SD725 £3.70
- 2SD787E £0.30
- 2SD811 £2.95
- 2SD836 £1.10
- 2SD837 £0.80
- 2SD845 £2.70
- 2SD868 £3.50
- 2SD869 £3.00
- 2SD870 £3.50
- 2SD871 £4.50
- 2SD895 £2.00
- 2SD898 £2.75
- 2SD898B £2.75
- 2SD900B £4.00
- BC107B £0.10
- BC108 £0.10
- BC108B £0.10
- BC115 £0.16
- BC118 £0.12
- BC147A £0.07
- BC159 £0.09
- BC171 £0.09
- BC172 £0.09
- BC172C £0.07
- BC182L £0.09
- BC183 £0.09
- TDA8180 ORIGINAL £9.50
- BC184 £0.08
- BC212 £0.09
- BC213 £0.09
- BC214A £0.07
- BC214B £0.07
- BC214L £0.09
- BC237 £0.07
- BC238 £0.07
- BC307 £0.12
- BC308B £0.07
- BC327-25 £0.07
- BC328-40 £0.05
- BC337 £0.07
- BC372 £0.95
- BC392 £1.50
- BC441 £0.25
- BC461 £0.25
- BC547 £0.07
- BC548 £0.07
- BC549 £0.07
- BC557 £0.30
- BC559B £0.07
- BC639 £0.18
- BC640 £0.30
- BD131 £0.50
- BD132 £0.40
- BD137 £0.35
- BD237 £0.22
- BD238 £0.22
- BD243B £0.30
- BD243C £0.40
- BD244 £0.30
- BD244C £0.30
- BD278A £0.80
- BD434 £0.80
- BD508 £0.90
- BF195 £0.07
- BF196 £0.15
- BF197 £0.15
- BF198 £0.07
- BF199 £0.14
- BF244 £0.40
- BF259 £0.22
- BF422 £0.15
- BF458 £0.22
- BF459 £0.22
- BF469/BF471 £0.25
- BF471 £0.25
- BF472 £0.25
- BF870/BF472 £0.25
- BU108 £0.75
- BU126 £1.40
- BU208 £1.00
- BU208A £1.25
- BU208D £1.15
- BU208T £1.00
- BU326A £1.00
- BU406 £0.90
- BU406D £1.50
- BU407 £0.50
- BU426A £1.00
- BU500 £1.00
- BU508A £1.00
- BU508AF £1.70
- BU508D £1.00
- BU806 £0.75
- BU807 £0.75
- BUT11 £0.95
- BUT11AF £1.95
- BUW84 £1.65
- BUX84 £0.60
- SD12659 £0.75
- T9064V £2.28
- TIP110 £0.45
- TIP112 £0.45
- TIP29 £0.30
- TIP30 £0.45
- TIP31 £0.30
- TIP32 £0.30
- TIP41 £0.27
- TIP42C £0.40
- TIP47 £0.90
- TIPL791A £1.20
- ZTR604 £0.55
- ZTX650 £0.70

DIODES AND THYRISTORS

- BA157 £0.07
- BR100 £0.20
- BR101 £1.40
- BR103 £0.75
- BR303 £1.50
- BRY56 £0.75
- BT116 £2.50
- BT128P £4.50
- BT129P £4.50
- BT151/800R £1.75
- BY126 £0.20
- BY127 £0.08
- BY133 £0.20
- BY164 £0.90
- BY164/SKB2/02 £0.90
- BY179 £1.10
- BY179/SK2/08 £1.10
- BY184 £0.65
- BY189 £2.00
- BY190 £2.00
- BY223 £2.80
- BY206 (BYB96R) £0.55
- BY210/800/BYV96 £0.55
- BY227 £0.20
- BY228 £0.50
- BY229 £1.15
- BY299 £0.50
- BY96D £0.30
- BYV96D £0.55
- BYW56 £0.50
- BYW96E £0.50
- BYX10 £0.50
- BYX55/600 £0.55
- FB2506 £1.50
- IN4001 £0.06
- IN4002 £0.08
- IN4004 £0.10
- IN4005 £0.10
- IN4006 £0.08
- IN4007 £0.08
- IN4148 £0.10
- IN5408 £0.25
- KBL08 £1.95
- OA91 £0.20
- OT112 £2.20
- RGP15G £0.45
- RGP15J £0.55
- RGP15K £0.35
- RGP30K £0.70
- RHI £1.30
- RM11C £0.45
- SG264 £8.50
- SG613 £12.00
- SKB/02 £0.80
- SKB/08 £1.20
- SKB2/02 £0.90
- SKB2/08 £1.10
- SKE1/02 £0.60
- SKE1M15 £0.65
- SKE2G2/02 £0.75
- SKE2G3/04 £1.30
- SKE4F1/04 £0.45
- SKE4F1/06 £0.45
- SKE5F3/10 £2.20
- SR2M £0.75
- T9053V £1.40
- T9064V £1.50

ASK FOR SEMICONDUCTORS NOT LISTED. PRICES SUBJECT TO CHANGE

SEND FOR PRICE LIST ☆ ☆ ☆ Trade Counter now open Monday-Friday 9.00-5.30. Saturday 9.00-1.00. Closed between 1.30pm-3.00pm every Friday. Nearest Underground Station – Southfields District Line.

OMEGA ELECTRONICS Compatible & Original Video Heads

PRICES CORRECT AT TIME OF GOING TO PRESS. PRICES EXCLUDE VAT AND CARRAIGE. FOR MODELS NOT LISTED PLEASE CALL

AIWA	
AEDK911	13.53
AEDK911MKII	13.53
AV66	12.92
AV77	12.92
AVS80	92.00
E303	13.97
G700	12.09
G900	13.53
HVDK510	13.53
HVDK510MKII	13.53
HVE101	13.53
HVE102	13.53
HVE105	13.53
HVE303	13.53
HVF85	71.18
HVG50	13.53
HVMG25	13.53
HVMG300	13.53
AKAI	
FSF11	17.47
VP7100	6.75
VP77	6.75
VP77	6.75
VP88	6.75
VP88	6.75
VS1	11.61
VS10	6.75
VS105	11.61
VS112	11.61
VS115	11.61
VS116	11.61
VS12	26.64
VS125	11.61
VS126	11.61
VS15	26.64
VS2	11.61
VS201	11.61
VS205	11.61
VS22	17.47
VS220	11.61
VS23	17.47
VS240	11.61
VS244	11.61
VS245	11.61
VS247	11.61
VS248	11.61
VS25	17.47
VS250	11.61
VS3	6.75
VS301	11.61
VS303	11.61
VS304	11.61
VS35	28.11
VS37	28.11
VS38	28.11
VS4	19.58
VS422	17.47
VS425	17.47
VS426	17.47
VS427	17.47
VS485	17.47
VS5	6.75
VS512	31.66
VS515	31.66
VS53	28.11
VS53	28.11
VS55	28.11
VS6	39.02
VS603	39.42
VS606	39.42
VS607	39.42
VS66	28.11
VS765	28.11
VS766	28.11
VS767	28.11
VS768	28.11
VS8	39.02
VS865	28.11
VS867	28.11
VS9	39.02
VS9300	6.75
VS9500	6.75
VS9700	6.75
VS9800	6.75
VSF10	17.47
VSF12	P.O.A
VSF15	P.O.A
VSF180	17.47
VSF190	17.47
VSF200	17.47
VSF210	17.47
VSF220	17.47
VSF221	17.47
VSF222	17.47
VSF230	17.47
VSF240	17.47
VSF250	17.47
VSF260	17.47
VSF261	17.47
VSF262	17.47
VSF265	17.47
VSF270	17.47
VSF275	17.47
VSF280	17.47
VSF290	17.47
VSF30	28.11
VSF33	28.11
VSF400	28.11
VSF410	28.11
VSF420	28.11
VSF430	28.11
VSF440	28.11
VSF441	28.11
VSF450	28.11
VSF455	28.11
VSF480	28.11
VSF490	28.11
VSF497	28.11
VSF510	17.47
VSP8	11.61
VSX400	17.47
VSX450	28.11
VSX470	28.11
ALBA	
VCR3000X	16.13
VCR4000X	16.13
VCR5000	16.13
VCR6000	16.13
VCR7000	13.97
VCR8000	13.97
VTV10	12.09
AMSTRAD	
DD8900	13.97
DD8904	13.97
TVR1	12.09
TVR2	12.09
TVR3	12.09
VCR1000	13.97
VCR2000	13.97
VCR4500	12.09
VCR4600	12.09
VCR4600ii	12.09
VCR4700	12.09
VCR5200	12.09
VCR6000	13.97
VCR6100	13.97
VCR6200	13.97
VCR7000	12.09
VCR8600	13.97
VCR8602	13.97
VCR8603	13.53
VCR8604	13.53
VCR8700	13.53
VCR8704	13.53
VCR8714	13.53
VCR8800	36.72
VCR8804	36.72
VCR9000	12.09
VCR9005	13.97
B & O	
VHS62	38.00
VHS63	38.00
VHS65	13.30
VHS80	13.30
BAIRD	
VC141L	23.76
VC142L	28.11
BUSH	
VCR3401	13.97
VCR3451	13.97
VCR3501	16.13
CROWN	
DVR6154D	16.13
DVR6158D	16.13
DVR6358D	16.13
VRD110	16.13
VRS250	13.97
VRS260	13.97
VRS350	13.97
VRS360	13.97
DAEWOO	
VCR12	16.13
VCR30	16.13
VCR32	16.13
VCR50	16.13
VCR52	16.13
DECCA	
VRH8300	6.75
FERGUSON	
3292	6.75
3V00	6.75
3V01	6.75
3V16	6.75
3V22	6.75
3V23	6.75
3V24	6.75
3V29	6.75
3V30	6.75
3V31	6.75
3V32	21.05
3V35	6.75
3V36	6.75
3V38	6.75
3V39	6.75
3V42	13.43
3V43	31.96
3V44	13.43
3V45	13.43
3V48	19.05
3V49	6.75
3V52	13.43
3V53	31.96
3V54	13.43
3V55	13.43
3V57	13.43
3V58	27.21
3V59	23.76
3V64	13.91
3V65	13.91
8900	6.75
8901	6.75
8902	6.75
8903	6.75
8904	6.75
8906	6.75
8909	6.75
8912	6.75
8922	6.75
8923	6.75
8924	6.75
8925	6.75
8929	6.75
8930	6.75
8931	6.75
8933	6.75
8940	6.75
8941	6.75
8942	21.05
8943	6.75
8944	6.75
8945	19.05
8947	13.43
8948	13.43
8950	13.91
8951	13.91
FV10B	13.91
FV11R	13.91
FV12L	23.76
FV13H	27.21
FV14T	29.95
FV20B	13.91
FV21R	13.91
FV22L	26.05
FV26D	13.91
FV30B	13.91
FV31R	25.04
FV32L	23.76
FV33H	27.21
FV37H	32.35
FV41R	25.04
FV42L	47.30
FV43H	29.96
FV44L	29.96
FV46T	77.00
VC141L	23.76
FIDELITY	
HQS200	13.97
VCR100	12.09
VCR1000	13.97
VCR2000	13.97
VCR201	13.97
VCR600	13.97
VCR6000	13.97
VCR6100	13.97
VR900	13.97
VTR1000	13.23
VTR1001	13.23
FINLUX	
VR1010	38.00
VR1020	38.00
VR1025	38.00
VR1030	38.00
VR2008	12.09
VR3009	13.97
VR8110	30.87
VR8110	32.17
FISHER	
FVD140	18.97
FVHD40	18.97
FVHD55	25.30
FVHP1	18.97
FVHP10	18.97
FVHP130	12.14
FVHP20	18.97
FVHP200	12.14
FVHP210	12.14
FVHP3	12.14
FVHP300	12.14
FVHP310	12.14
FVHP320	P.O.A
FVHP420	13.23
FVHP5000	13.43
FVHP5005	13.43
FVHP5050	13.43
FVHP5075	13.43
FVHP5100	13.43
FVHP520	13.23
FVHP530	13.23
FVHP615	13.23
FVHP618	13.23
FVHP620	13.23
FVHP622	13.23
FVHP710	13.23
FVHP711	13.23
FVHP720	13.23
FVHP721	13.23
FVHP722	13.23
FVHP725	28.11
FVHP730	13.23
FVHP830	13.23
FVHP905	13.23
FVHP906	13.43
FVHP908	13.23
FVHP910	13.23
FVHP911	13.23
FVHP915	13.43
FVHP916	13.43
FVHP918	13.43
FVHP980	28.11
FUJITSU	
HS750	12.09
HS760	12.09
VGX715	12.09
VGX720	12.09
FUNAI	
V1	12.09
V2S	12.09
VCR4000	12.09
VCR4500	12.09
VCR4530	13.97
VCR4600	12.09
VCR4800	12.09
VCR5200	12.09
VCR5400	12.09
VCR5600	12.09
VCR5800	13.53
VCR5803	13.53
VCR5840	13.97
VCR5843	13.97
VCR6600	12.09
VCR6800	13.97
VCR6803	13.97
VIP1000	12.09
VIP150	13.97
VIP3000	12.09
VIP5000	12.09
VIP6000	13.97
VP1400	12.09
GEC	
4000H	13.30
4001H	13.30
4002H	13.30
4004	13.30
4005H	18.90
V4000	13.30
V4001	13.30
V4002	13.30
V4004	13.30
V4100	13.30
GOLDSTAR	
GHV1221	11.90
GHV1232	11.90
GHV1240	11.90
GHV1241	11.90
GHV1242	11.90
GHV1243	11.90
GHV1244	11.90
GHV1245	11.90
GHV1246	11.90
GHV1247	11.90
GHV1248	11.90
GHV1290	11.90
GHV1291	11.90
GHV1295	11.90
GHV1296	11.90
GHV1891	11.90
GHV51	11.90
GHV8000	25.15
GHV8200	25.15
GHV8210	25.15
GHV8215	25.15
GSE1296	11.90
VCP4000	11.90
VCP4100	11.90
VCP4130	11.90
VCP4200	11.90
VCP4300	11.90
VCP4301	11.90
VCP4305	11.90
VCP4306	11.90
VCP4310	11.90
VCP4311	11.90
VCP4315	11.90
VCP4316	11.90
VCP4320	11.90
VCP4321	11.90
VCP4325	11.90
VCP4326	11.90
GOODMANS	
DVR6500	16.13
PX2400	13.97
TX1100	13.97
TX2400	13.97
VCP550	13.97
VCR1000	11.90
VCR101	12.09
VCR2000	16.13
VCR2500	38.00
VX1200	13.97
GRANADA	
VHSAH1	13.30
VHSAH3	22.75
VHSAN3	8.64
VHSAY3	13.00
VHSBH1	18.90
VHSBP1	8.64
VHSBY3	30.87
VHSCH1	18.90
VHSCS1	13.75
VHSDH2	18.95
VHSDP1	39.00
VHSDS2	13.75
VHSEH2	23.21
VHSEH3	23.21
VHSES2	18.97
VHSEY1	13.00
VHSEY2	13.00
VHSF63	13.97
VHSFB5	22.94
VHSFG2	13.97
VHSFG4	13.97
VHSFH6	13.97
VHSFJ4	32.35
VHSFP2	13.00
VHSNV3	6.75
VHSTJ3	6.75
VHSVN1	6.75
VHSWH1	13.30
VHSWH3	13.30
VHSWJ1	6.75
VHSWJ3	6.75
VHSWN2	6.75
VHSXH1	13.30
VHSXH3	13.30
VHSXJ3	6.75
VHSXN2	6.75
VHSXY2	13.00
VHSYH2	13.30
VHSYJ2	6.75
GRUNDIG	
GV200	12.25
GV2005	12.25
GV201	12.25
GV2092	12.25
GV210	20.62
GV2105	20.62
GV211	20.62
GV2115	20.62
GV220	20.62
GV2292	20.62
GV280	57.71
MADRID	30.98
MVS400	12.25
MVS440	12.25
MVS500	12.25
MVS550	23.29
MVS600	12.25
MVS620	23.29
MVS660	39.98
MVS710	20.62
MVS720	20.62
MVS910	20.62
MVS9105	20.62
SE5110	12.25
SE5140	30.98
SE6110	12.25
SE7120	20.62
SE9100	12.25
SE9120	20.62
SVSC80	P.O.A
SVSC85	P.O.A
TVR4500	12.25
TVR4510	12.25
TVR5505	17.01
TVR5510	12.25
VS120	25.85
VS160	62.31
VS170	65.20
VS400	12.25
VS410	17.01
VS440	12.25
VS441	12.25
VS450	17.01
VS456	17.01
VS460	17.01
VS500	12.25
VS505	12.25
VS510	12.25
VS5180	12.25
VS520	17.01
VS521	17.01
VS530	17.01
VS540	30.98
VS5480	30.98
VS550	23.29
VS600	12.25
VS610	12.25
VS6190	12.25
VS620	23.29
VS630	23.29
VS640	23.29
VS700	12.25
VS710	20.62
VS716	20.62
VS720	20.62
VS740	30.98
VS7400	30.98
VS790	23.29
VS800	20.62
VS810	20.62
VS900	12.25
VS901	12.25
VS902	12.25
VS910	20.62
VS920	20.62
VS930	23.29
VS940	23.29
VSC40	50.85
VSC45	65.12
VSC60	67.22
VSC70	P.O.A
HINARI	
V20H	12.09
VCR34H	13.97
VTV100	13.97
VTV200	13.97
VTV300	12.09
VXL10	13.97
VXL11	13.97
VXL12	12.09
VXL19	13.97
VXL2	12.09
VXL20	12.09
VXL200	13.97
VXL3	12.09
VXL35	12.09
VXL4	12.09
VXL5	12.09
VXL6	12.09
VXL7	13.97
VXL8	13.97
VXL9	13.97
VXL90	13.97
HITACHI	
VT100	18.95
VT11	13.30
VT110	18.95
VT111	18.95
VT113	18.95
VT115	18.95
VT118	18.95
VT120	18.95
VT125	18.95
VT128	18.95
VT130	23.21
VT135	23.21
VT138	23.21
VT14	13.30
VT145	23.21
VT150	31.72
VT16	22.75
VT168	31.72
VT17	22.75
VT19	22.75
VT220	18.95
VT225	18.95
VT250	23.21
VT255	23.21
VT258	23.21
VT3000	6.75
VT33	13.30
VT330	13.30
VT35	38.00
VT350	38.00
VT38	38.00
VT39	38.00
VT400	18.95
VT405	18.95
VT410	18.95
VT413	18.95
VT414	18.95
VT415	18.95
VT418	18.95
VT420	23.21
VT425	23.21
VT426	23.21
VT428	23.21
VT430	23.21
VT431	23.21
VT435	23.21
VT438	23.21
VT450	42.00
VT498	31.72
VT510	18.95
VT518	18.95
VT52	28.00
VT520	18.95
VT522	22.05
VT525	18.95
VT526	18.95
VT530	23.21
VT535	23.21
VT536	23.21
VT538	42.00
VT540	31.79
VT545	31.79
VT546	31.79
VT548	31.79
VT548	31.79
VT57	32.65
VT570	32.65
VT575	32.65
VT576	32.65
VT580	32.65
VT585	32.65
VT588	32.65
VT598	31.79
VT61	18.90
VT62	18.90
VT63	18.90
VT64	18.90
VT640	28.00
VT640	18.90
VT6500	13.30
VT680	13.30
VT6800	13.30
VT7	22.75
VT7000	13.30
VT8	32.65
VT8000	13.30
VT8500	13.30
VT9300	13.30
VT9500	13.30
VT9700	13.30
VT9900	13.30
VTD660	31.79
VTD665	31.79
VTL30	23.21
VTM598	31.79
VTM620	22.05
VTM622	22.05
VTM625	22.05
VTM626	22.05
VTM630	23.21
VTM635	23.21
VTM636	23.21
VTM640	31.79
VTM645	31.79
VTM646	31.79
VTM720	18.95
VTM722	22.05
VTM725	18.95
VTM726	18.95
VTM728	18.95
VTM730	31.79
VTM731	31.79
VTM735	31.79
VTM736	31.79
VTM740	31.79
VTM745	31.79
VTM746	31.79
VTM748	31.79
VTM753	31.79
VTM754	31.79
VTM820	18.95
VTM821	18.95
VTM822	22.05
VTM825	18.95
VTM830	31.79
VTM831	31.79
VTM835	31.79
VTM840	31.79
VTM841	31.79
VTM845	31.79
VTM920	18.95
VTM921	18.95
VTM922	18.95
VTM925	18.95
VTM930	31.79
VTM931	31.79
VTM935	31.79
ITT	
P3833	6.75
VP3826	13.43
VR3520	12.14
VR3605	6.75
VR3701	12.14
VR3719	12.14
VR3720	12.14
VR3721	12.14
VR3730	32.30
VR3731	32.30
VR3749	32.30
VR3759	12.14
VR3769	12.14
VR3826	13.43
VR3833	6.75
VR3905	6.75
VR3906	13.43
VR3907	12.23
VR3908	12.23
VR3912	6.75
VR3913	6.75
VR3914	6.75
VR3916	13.43
VR3917	13.75
VR3918	18.97
VR3919	18.97
VR3926	13.43
VR3927	13.91
VR3928	39.00
VR3929	39.00
VR3935	6.75
VR3938	18.97
VR3943	6.75
VR3946	13.43
VR3948	13.43
VR3954	6.75
VR3963	6.75
VR3975	6.75
VR3976	19.05
VR3977	27.21
VR3985	6.75
VR3986	19.05
VR3993	6.75
VR3994	21.05
VR3995	31.96
VR3997	31.96
VR3998	25.30
VR6948	13.43
VR9719	12.14
VR9720	12.14
JVC	
BR5000	6.75
BR9060E	29.96
HR2200	6.75
HR2650	6.75
HR3300	6.75
HR3330	6.75
HR3660	6.75
HR4100	6.75
HR7200	6.75
HR7300	6.75
HR7350	6.75
HR7600	6.75
HR7610	6.75
HR7650	6.75
HR7655	21.05
HR7700	6.75
HRD110	6.75
HRD111	6.75
HRD120	6.75
HRD121	6.75
HRD140	13.43
HRD150	13.43
HRD157	13.43
HRD158	13.43
HRD160	13.43
HRD170	13.91
HRD171	13.91
HRD180	23.76
HRD210	13.91
HRD211	13.91
HRD217MS	13.91
HRD225	6.75
HRD230	23.76
HRD250	25.31
HRD257	25.31
HRD300	26.66
HRD320	13.91
HRD321	13.91
HRD330	29.96
HRD337	29.96
HRD350	13.91
HRD370	27.21
HRD400	26.66
HRD430	27.21
HRD440	29.96
HRD455	19.05
HRD470	27.21
HRD500	23.76
HRD520	13.91
HRD530	29.95
HRD540	13.91
HRD550	13.91
HRD560	13.91
HRD565	19.05
HRD566	19.05
HRD580	26.66
HRD600	26.66
HRD610	23.76
HRD620	26.66
HRD637	29.96
HRD640	26.66
HRD641	29.96
HRD650	26.66
HRD660	29.96
HRD670	29.96
HRD700	13.91
HRD720	29.96
HRD725	31.96
HRD730	29.96
HRD740	29.96
HRD750	27.21
HRD755	31.96
HRD830	32.35
HRD840	29.95
HRD860	32.35
HRD870	29.95
HRD910	29.95
HRD950	77.00
HRD960	77.00
HRD980	77.00
HRDX20	13.91
HRDX22	13.91
HRFC100	29.96
HRP50	13.43
HRS10	13.43
KENWOOD	
KV901	6.75
KV903	6.75
KV905	6.75
LOEWE	
OC410	18.95
OC420	18.95
OC440	18.95
OC50	18.90
OC510	18.95
OC520	18.95
OC540	18.95
OC55	18.90
OC550	23.21
OC60	18.90
OC630	23.21
OC635	18.95
OC65	18.90
OC730	23.21
OC735	23.21
OC820	18.95
OC920	18.95
OC940	31.79
OC950	31.79
LOGIK	
VR750	12.23
VR950	12.23
VR955	12.23
VR960A	12.09
LUXOR	
9245	13.23
9251	13.23
9252	23.58
9253	24.64
9254	13.23
9255	13.75
9270	18.97
9271	18.97
9272	28.11
9273	18.97
9280	17.47
9281	32.30
9282	28.11
9284	12.14
9290	17.47
9290-17	17.47
9292	P.O.A
929S	12.14
VR3701	12.14
VR3721	12.14
VR3731	32.30
MARANTZ	
MV340	13.00
MV464	38.00
MV593	23.29
MV685	61.45
MV693	39.98
MATSUI	
VCP100	11.90
VX3000	12.09
VX730	12.09
VX735	12.09
VX735A	12.09
VX750	12.09
VX755	12.09
VX800	12.09
VX810	12.09
VX820	12.09
VX880	12.09
MEMOREX	
VR1500	11.90
VR1700	11.90
VR3200	13.97
MITSUBISHI	
HS200	6.75
HS300	17.32
HS301	17.32
HS302	17.32
HS303	17.09
HS304	17.09
HS306	15.40
HS307	23.58
HS310	17.32
HS318	15.40
HS319	24.64
HS320	17.09
HS330	36.09
HS337	17.37
HS338	25.58
HS347	17.37
HS349	32.83
HS400	21.42
HS480	25.58
HS5300	42.45
HS700	17.09
HS710	15.40
HSB10	25.58
HSB11	25.55
HSB20	25.58
HSB21	25.55
HSB30	29.23
HSB31	32.83
HSE10	25.58
HSE11	25.55
HSE20	25.58
HSE21	25.55
HSE30	29.23
HSE31	32.83
HSE32	32.83
HSE41	25.55
HSM35	32.83
HSM37	32.83
MURPHY	
VCR7101	13.97
NEC	
DX1000	12.76
DX2000	27.21
DX3000	25.30
DX4000	25.30
N830	6.75
N831	6.75
N832	6.75
N833	6.75
N895	31.96
N9012	12.76
N9013	12.76
N9014	12.76
N9016	12.76
N9033	12.76
N9034	12.76
N9053	12.76
N9054	12.76
N9055	12.76
N9066	12.76
N9077	12.76
N9110	27.21
N9120	27.21
N9510	25.30
N9520	25.30
N9530	27.21
N9610	25.30
NIKKAI	
NVP89	11.90
NVR100	16.13
NVR500	16.13
VCRT101	12.23
NORDMENDE	
V100	6.75
V1001	13.43
V1005	13.43
V101	6.75
V1015	13.43
V102	6.75
V1025	13.43
V103	6.75
V1035	13.43
V1041	13.43
V1055	13.43
V1065	13.43
V110	13.00
V1105	13.43
V112	6.75
V1205	13.91
V1215	13.91
V1235	13.91
V1305	23.76
V140	6.75
V1403	13.91
V1405	13.91
V141	6.75
V142	6.75
V1500	26.66
V1500T	26.66
V1503	26.66
V1505	26.66
V1805	29.95
V2000	26.66
V2000D	29.95
V2000P	26.66
V2405	23.76
V250	6.75
V2500	27.21
V300	6.75
V3005	19.05
V301	6.75
V304	13.43
V3105	27.21
V333	13.00
V3405	27.21
V3505	32.35
V380	21.05
V4000	32.35
V4405	29.95
V500	6.75
V5005	31.96
V502	31.96
V503	31.96
V900	13.91
V905	13.91
OSAKI	
V20H	12.09
V500	13.97
VCR25	13.97
VCR31	11.90
VCR32	11.90
VCR33	11.90
VCR34	13.97
VCR35	13.97
OSUME	
VCR9000	13.97
PANASONIC	
AG1000	17.01
AG1050	17.01
AG5250	39.98
AG6010	32.80
AG6015	32.60
AG6024	23.29
AG6100	32.60
AG6200	32.60
AG6800	23.13
AG6810	23.13
NV100	8.64
NV180	25.85
NV2000	6.75
NV2010	6.75
NV230	12.25
NV250	17.01
NV280	17.01
NV300	6.75
NV3000	6.75
NV332	6.75
NV333	6.75
NV340	6.75
NV366	19.06
NV370	8.64
NV430	12.25
NV450	17.01
NV460	17.01
NV465	17.01
NV470	17.01
NV600	17.01
NV688	36.00
NV7000	6.75
NV7200	6.75
NV730	19.06
NV770	19.06
NV777	17.01
NV7800	6.75
NV788	30.98
NV810	30.98
NV8170	6.75
NV8200	6.75
NV830	30.98
NV8400	6.75
NV850	38.86
NV8600	6.75
NV8610	6.75
NV8620	6.75
NV870	37.42
NV890	37.42
NVD48	25.85
NVD80	39.98
NVF65	39.98
NVF70	46.10
NVFS1	57.71
NVFS100	P.O.A
NVG10	17.01
NVG12	17.01
NVG130	20.62
NVG14	17.01
NVG15	17.01
NVG18	25.85
NVG20	25.85
NVG21	25.85
NVG25	25.85
NVG30	20.62
NVG300	26.55
NVG33	23.29
NVG40	20.62
NVG400	42.88
NVG45	23.29
NVG50	26.55
NVG500	26.55
NVG7	12.25
NVH65	35.38
NVH65	35.38
NVH70	36.52
NVH75	39.98
NVJ1	20.62
NVJ101	20.62
NVJ3	20.62
NVJ30	20.62
NVJ33	20.62
NVJ35	23.29
NVJ36	20.62
NVJ37	20.62
NVJ4	20.62
NVJ40	20.62
NVJ42	20.62
NVJ45	23.29
NVJ47	23.29
NVL10	20.62
NVL20	20.62
NVL25	23.29
NVL28	23.29
NVM1	62.31
NVM1	62.31
NVM10	64.80
NVM3	62.31
NVM5	62.31
NVM7	65.20
NVMC10	67.22
NVMC20	65.12
NVMC30	P.O.A
NVMC5	66.92
NVMC6	50.85
NVMS1	P.O.A
NVMS50	P.O.A
NVMS90	P.O.A
NVP10	20.62
PHILIPS	
20DV1	39.00
20DV2	39.00
20RW7	39.00
21DV1	39.00
2SB01	39.00
2SB02	39.00
2SB11	39.00
41DV2	23.29
49SB6	21.59
4SB11	23.29
68SB4	39.00
71SB4	39.00
71SB8	61.45
72SB8	61.45
DV186	39.00
DV190	39.00
DV291	39.00
DV292	39.00
DV464	38.00
DV468	39.00
DV471	39.00
VKR6800	62.31
VKR6810	62.31
VKR6820	62.31
VKR6837	50.85
VKR6843	65.12
VKR6850	65.20
VKR6855	65.20
VKR9005	P.O.A
VR201	39.00
VR202	39.00
VR203	39.00
VR20DV1	39.00
VR20DV2	39.00
VR20RW7	39.00
VR2SB01	39.00
VR2SB02	39.00
VR415	23.29
VR49SB6/20	21.59
VR6180	39.00
VR6182	39.00
VR6185	39.00
VR6290	39.00
VR6291	39.00
VR6293	39.00
VR6362	39.00
VR6367	39.00
VR6442	13.00
VR6442	13.00
VR6448	13.00
VR6448/69S	13.00
VR6460	8.64
VR6462	38.00
VR6463	38.00
VR6464	38.00
VR6467	39.00
VR6468	39.00
VR6470	39.00
VR6485<WD12	23.29
VR6520	8.64
VR6540	13.00
VR6542	13.00
VR6542/05	13.00
VR6548	21.59
VR6560	38.00
VR6580	13.00
VR6581	13.00
VR6648	21.59
VR6660	38.00
VR6711	25.85
VR6843	21.59
VR6870	61.45
VR6880	23.29
VR68SB4	39.00
VR6920	38.86
VR6948	57.71
VR6970	61.45
VR6975	61.45
VR71SB4	39.00
VR71SB8	61.45
VR72SB8	61.45
VR86SB1	39.00
VR91SB2	39.00
VR92SB2	39.00
PIONEER	
VED70	92.00
VR515	23.21
PROLINE	
5000XR	12.09
5100XT	12.09
7000	13.00
9000XT	13.97
9100	13.97
DX3300	13.97
PYE	
64VR60	8.64
65VR20	8.64
DV464	38.00
QUESTAR	
100	16.13
200	16.13
VR-100	12.23
SAISHO	
VH1200HQ	12.09
VHL3	12.09
VP3000	11.90
VR100	12.09
VR1000	12.09
VR1100	12.09
VR1600	12.09
VR2000	46.61
VR3200	12.09
VR3300	12.09
VR3300X	12.09
VR3400	12.09
VR3500	12.09
VR3600	12.09
VR605	12.09
VR705S	12.09
VR805S	12.09
VR905	12.09
VR905S	12.09
SALORA	
SV601	17.47
SV601	17.47
SV611	17.47
SV6500	13.75
SV6600	13.75
SV6700	18.97
SV6800	12.14
SV6900	12.14
SV6910	17.47
SV7300	17.09
SV7400	15.40
SV8100	13.30
SV8200	17.09
SV8300	17.09
SV8400	15.40
SV8420	23.58
SV8500	15.40
SV8520	24.64
SV8550	21.42
SV8600	17.37
SV8700	17.37
SV8710	18.97
SV8750	18.97
SV8800	25.55
SV8810	32.30
SV8820	37.64
SV8830	29.23
SV8830	29.23
SV8850	12.14
SV8870	12.14
SV8910	32.30
SV8920	P.O.A
SV8970	12.14
SV9200	17.09
SV9300	36.09
SAMSUNG	
PX980	12.23
PX981	12.23
PX982	12.23
SE9001	12.23
SV716	12.23
SV717	12.23
SV9001	12.23
SVX301	12.23
SVX303	12.23
SVX305	12.23
SVX307	12.23
SVX319	13.25
SX1260	39.00
SX1261	39.00
SX7301	39.00
VB510	12.23
VB520	12.23
VB610	12.23
VB616	12.23
VB617	12.23
VB619	12.23
VB620	12.23
VB626	12.23
VB627	12.23
VB629	12.23
VB710	12.23
VB770	13.25
VB8220	12.23
VB900	12.23
VB910	12.23
VB971	12.23
VD6225	12.23
VI510	12.23
VI520	12.23
VI611	12.23
VI616	12.23
VI621	12.23
VI626	12.23
VI710	12.23
VI730	13.25
VI770	13.25
VI790	13.25
VI8220	12.23
VI8225	12.23
VI900	12.23
VI910	12.23
VK-8220	12.23
VPX31	12.23
VX510	12.23
VX520	12.23
VX616	12.23
VX617	12.23
VX619	12.23
VX626	12.23
VX627	12.23
VX629	12.23
VX710	12.23
VX712	12.23
VX720	12.23
VX730	12.23
VX750	12.23
VX770	13.25
VX8220	12.23
VX8225	12.23
VX970	12.23
VX971	12.23
VX972	12.23
VX9880	25.30
SANYO	
VHR1100	13.75
VHR1150	13.75
VHR1200	13.75
VHR1300	13.75
VHR14	12.14
VHR15	12.14
VHR1500	22.71
VHR16	33.75
VHR2100	13.75
VHR2300	13.75
VHR2500	22.71
VHR2700	33.55
VHR3100	18.97
VHR3150	18.97
VHR3200	18.97
VHR3270	18.97
VHR3300	18.97
VHR3310	18.97
VHR3500	18.97
VHR3700	25.30
VHR4100	12.14
VHR4150	33.75
VHR4200	12.14
VHR4300	12.14
VHR4350	33.75
VHR4770	37.64
VHR5100	12.14
VHR5200	12.14
VHR5300	32.30
VHR5350	P.O.A
VHR7100	12.14
VHR7200	12.14
VHR7260	33.75
VHR7400	32.30
VHR7500	P.O.A
VHR7530G	P.O.A
VHR7540G	P.O.A
VHR8100	12.14
VHR8200	12.14
VHR8250	33.75
VHR8500	P.O.A
VHRD4400	12.14
VHRD4401	12.14
VHRD4410	12.14
VHRD4500	12.14
VHRD4600	12.14
VHRD4610	12.14
VHRD500	18.97
VHRD6700	12.14
VHRD700	25.30
VMD1P	92.00
VPR5800	18.35
VTC3000	12.92
VTC5000	18.35
VTC5150	18.35
VTC5300	18.35
VTC5350	18.35
VTC5400	18.35
VTC6000	18.35
VTC6500	18.35
VTCM10	18.35
VTCM11	18.35
VTCM20	18.35
VTCM21	18.35
SCHNEIDER	
Please Call Sales	
SENTRA	
GX8000	16.13
GX8200HQ	16.13
VCR7620	13.97
VCR8000	11.90
VX5000	16.13
VX8000	16.13
VX8400	16.13
VX8500LP	13.97
VX8600LP	13.97
SHARP	
VC200	13.00
VC220	13.00
VC2300	32.17
VC300	13.00
VC3300	13.00
VC381	13.00
VC384	13.00
VC385	13.00
VC386	13.00
VC387	13.00
VC388	13.00
VC390	34.00
VC402	13.00
VC405	13.00
VC471	13.00
VC473	30.87
VC477	13.00
VC481	13.00
VC482	13.00
VC483	30.87
VC486	30.87
VC496	34.00
VC500	13.00
VC571	13.00
VC573	13.00
VC581	13.00
VC582	13.00
VC583	13.00
VC584	13.00
VC585	30.87
VC5W20E	13.00
VC600	13.00
VC6000	32.17
VC6200	32.17
VC6300	32.17
VC651	13.00
VC681	13.00
VC682	13.00
VC684	13.00
VC685	30.87
VC700	13.00
VC7300	32.17
VC750	13.00
VC7700	32.17
VC772	13.00
VC7750	32.17
VC779	21.59
VC780	13.00
VC781	13.00
VC7810	13.00
VC782	13.00
VC7822	13.00
VC782ii	13.00
VC783	13.00
VC785	26.12
VC786	26.12
VC787	21.59
VC8000	32.17
VC8300	32.17
VC8381	13.00
VC8481	13.00
VC8581	13.00
VC9300	13.00
VC9500	13.00
VC9700	13.00
VCA10	13.00
VCA100	13.00
VCA102	13.00
VCA103	13.00
VCA1031	13.00
VCA104	13.00
VCA105	13.00
VCA106	13.00
VCA202	13.00
VCA203	13.00
VCA211	13.00
VCA234	13.00
VCA244	13.00
VCA255	13.00
VCA30	13.00
VCA35	13.00
VCA40	13.00
VCA50	21.59
VCA501	21.59
VCA505	21.59
VCA60	21.59
VCA602	21.59
VCA605	21.59
VCA615	21.59
VCB320	13.00
VCB361	21.59
VCC10	62.31
VCC10	62.31
VCD801	13.00
VCD802	13.00
VCD806	21.59
VCD810	21.59
VCD815	21.59
VCM73	13.00
VCT212	13.00
VCT310	13.00
VCT410	13.00
VCT810	21.59
VCT72	13.00
VCTI314	13.00
VCTS313	13.00
SOLAVOX	
NCVR1000	16.13
NCVR5000	16.13
SONY	
EVA300	92.00
EVADT1	92.00
SL3000	12.92
SLC20	12.92
SLC24	12.92
SLC30	12.92
SLC33	12.92
SLC44	12.92
SLC5	12.92
SLC6	12.92
SLC7	12.92
SLC9	29.70
SLF1	12.92
SLF30	12.92
SLT20	12.92
SLT30	12.92
SLT6	12.92
SLT7	12.92
SLV125	12.14
SLV201	23.21
SLV202	23.21
SLV210	12.25
SLV212	12.25
SLV213	12.14
SLV225	12.14
SLV252	12.14
SLV255	12.14
SLV262	12.14
SLV270	12.25
SLV273	12.25
SLV275	23.29
SLV300	12.25
SLV310	20.62
SLV410	33.55
SLV415	33.55
SLV425	23.29
SLV427	23.29
SLV474	33.55
SLV801	32.65
SLV802	32.65
SLVX20	12.14
SUSUMU	
XR1	11.90
TASHIKO	
VVC011	13.43
VVC021	13.75
VVC031	13.43
VVC041	13.00
VVC044	13.00
VVC051	38.00
VVC061	12.25
VVC062	19.06
VVC063	37.42
VVC091	13.43
VVC092	13.43
VVC093	31.96
VVC101	13.23
VVD031	13.30
VVD041	13.00
VVD042	30.87
VVD051	39.00
VVD061	12.25
VVD062	25.85
VVD101	13.23
VVD102	13.23
VVD141	12.76
VVD142	12.76
VVD171	12.09
VVD172	12.09
VVD173	12.09
VVD931	12.09
VVD932	12.09
VVD951	13.00
VVD971	12.23
VVE021	18.97
VVE041	13.00
VVE061	17.01
VVE062	25.85
VVE121	23.21
VVE122	18.95
VVE181	13.91
VVE182	23.76
VVE183	29.96
VVE201	11.90
VVE921	11.90
VVE931	12.09
VVE932	12.09
VVE933	13.97
VVF933	13.97
VVF934	13.97
TATUNG	
TVR6100	13.97
TVR6111	13.97
VR6111	13.97
VRH8350	11.61
VRH8490	38.00
TOSHIBA	
DV80	13.30
DV90	13.30
DV96	13.30
DV97	13.30
V108	13.30
V109	13.30
V110B	25.04
V120	25.04
V130	25.04
V140	25.04
V199	13.30
V200	13.30
V202	13.30
V205	13.30
V207	13.30
V209	13.30
V210	25.04
V211	25.04
V212	25.04
V220	25.04
V221	25.04
V222	25.04
V300	26.86
V309	26.86
V31	14.97
V33	14.97
V500	22.94
V509	22.94
V51	14.97
V53	14.97
V55	6.75
V57	6.75
V65	13.43
V66	13.43
V67	13.43
V700	25.30
V71	13.30
V73	13.30
V74	13.30
V75	13.30
V77	13.30
V81	13.30
V83	13.30
V85	13.30
V86	13.30
V8600	26.00
V91	39.00
V93	13.30
V94	13.30
V9600	14.97
TRIUMPH	
VR9501	12.09
VR9511	12.09
VR9525	12.09

TEL: 081-961 7071 FAX: 081-965 7813

UNIT 19, CUMBERLAND BUSINESS PARK, CUMBERLAND AVENUE, PARK ROYAL, LONDON NW10 7RT.

special satellite receiver with a static threshold below 2·5dB. The SRX200E features digital signal processing and is intended as a monitoring or test receiver. Price is DM5,500, in Germany – carriage extra. For further information write to NKM-Eleektronik GmbH, PO box 1705, D-79507 Loerrach, Germany.

TV-DXing for Beginners

Last month we described suitable aerials for Band I reception. The choice of aerials for Band III and u.h.f. reception is perhaps more difficult. For Band III, various imported aerials such as those in the Triax range are available while Jaybeam still produce Band III aerials in the UK, mainly for the Irish market. An eight- or eleven-element aerial is best for DXing, to provide adequate forward gain and directivity, minimising pick-up from Band III mobile radio services. The potential for Band III DX reception is high, particularly if you live in the east or north east where signals from Scandinavia, Germany, France and the Benelux countries are frequent when tropospheric conditions are suitable. Those to the west often receive signals from Spain, Portugal, France and Ireland.

U.H.F. aerial systems are more readily available. For maximum forward gain and directivity, to discriminate against local and often strong UK transmissions, a Yagi aerial with half-wave elements or multiple (X formation) directors is a good choice. Well-known systems include the Fuba XC391, the Triax Unix 92, the Antiference XG range and the Jaybeam full-wave system. An alternative approach is to use a stacked bow-tie array. This consists of a reflector panel with perhaps four full-wave dipoles in front. Examples include the Triax Grid and Wolsey Colour King range. The gain over the bandwidth is flatter with this type of aerial.

There are locations where the chance of tropospheric DX reception in Band III and at u.h.f. is not good – where mountains, hills or heavily forested slopes obstruct likely signal paths for example. In such a situation it's best to devote whatever funds are available to an improved Band I installation – the alternative is satellite reception!

Band I reception is prone to interference – from thermostats, ignition, electric motors, CB harmonics, overloading etc. Because of this it's best to provide filtering before any amplification is added. Amplifiers should be installed indoors, adjacent to the receiver. High-gain Band III and

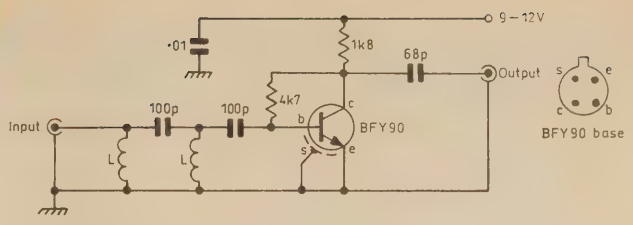


Fig. 1: A simple, easy-to-build v.h.f. amplifier. Typical voltage gain figures 16dB at 50MHz, 13dB at 100MHz, 11dB at 200MHx. The coils (L) consist of ten 1/8th inch diameter turns, close spaced, of 24 s.w.g. enamelled wire. The supply requirement is 9-12V at 5mA.

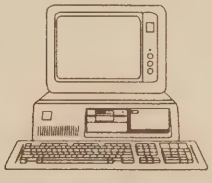
u.h.f. aerial systems usually have head amplifiers fitted, to overcome cable losses and improve the signal/noise performance. Note that a low noise figure is more important than maximum gain, i.e. an amplifier that provides a gain of 12dB with a 1·5dB noise figure will give better results than an amplifier with a gain of 40dB but a noise contribution of 5dB. Many Band III/u.h.f. amplifiers are available from specialist dealers. Manufacturers include Fringe, Triax, Labgear, Teldis and Antiference. Head amplifiers are normally powered via the coaxial downlead.

A few Band I amplifiers are available commercially. At these frequencies constructional techniques are less demanding than in Band III and at u.h.f. Fig. 1 shows a simple preamplifier circuit that will work throughout Bands I/III. Its cost to build is minimal. Use normal v.h.f. construction techniques, i.e. keep component leads short. There are no tuned circuits and provided care is taken with assembly the amplifier will work at up to 450MHz.

An aerial used for the reception of weak signals should be mounted clear of obstructions and in the open. This may give rise to complaints from neighbours. Explain to them what the purpose is and that the aerials won't cause interference or attract lightning. Most will be understanding. Council planning departments can be less tolerant.

An aerial rotator system will generally be required. Radio dealers and specialist firms can supply them. Finally remember that each aerial installation will be unique, to cater for the needs and possibilities at a particular location. We can only generalise here. If you have a specific problem, write in with a stamped-addressed envelope and we'll try to help.

TELEVISION INDEX & DIRECTORY
and REPRINTS SERVICE



A computerised index to *TELEVISION* magazine covering volumes 38 to 42 (1988 – 1992) is now available. It contains over 3500 references to TV/VCR fault reports and articles, with synopses. It includes a TV/VCR spares guide, an advertisers list and a directory of trade & professional organisations. The software is easy to use and very quick. It runs on any IBM or compatible PC with 512K RAM and a hard disc.

Price: £30 (specify 5.25" or 3.5" format)

Reprints of articles from *TELEVISION* back to 1986 are also available: ordering information is provided with the index, or can be obtained from the address below. Hard copy indexes of *TELEVISION* are available for volumes 38 to 42 at £3.50 each.

Please allow up to 28 days for delivery. All the above prices include UK postage and VAT where applicable. Cheques should be made payable to Video Interface Products.

Video Interface Products Ltd., 1 Vineries Close, Cheltenham GL53 0NU, UK.

Notes on the Bush 2521T

Chris Watton

One of these teletext sets gave us some trouble recently. It worked fine in the TV mode but when it was put into the text mode there was no display. It had entered the text mode, because the programme buttons no longer changed the channels. Putting it in the mixed mode produced a picture with black text on it – no colours at all. The cause of the trouble was corrupt memory in the control section. It was giving the order to produce teletext with no contrast. You get a similar problem with some Hitachi sets that lose memory, the MDA2062 EEPROM becoming stupified. What you have to do is to reprogram the set. This involves using the buttons on the remote control handset to toggle various bits on or off. The sequence is as listed below. Figs. 1-7 show the relevant bits: the numbers shown against the segments are the handset button numbers that toggle them on or off.

Reprogramming

(1) You first have to fit a temporary press-button switch between pins 15 and 23 of the SAA1250 chip in the handset (connect it between pins 3 and 12 if an OSH2006P chip is used). The small switch from the front of an old VCR is ideal. Switch the set on and select channel 1. The set must be tuned to a station, and it must be in the TV mode.

(2) Press the 'service button' – the extra one added to the handset – and hold it until the display shows CH. Press again to get OP, then select option 1 by pressing the volume up button once. You should now have the display shown in Fig. 1. If any of the segments are incorrect, use buttons 1-8 on the handset to correct them. For example pressing button 1 will toggle the top, right-hand segment on or off.

(3) When the display is correct, press the memory button. Two brackets will appear, as shown in Fig. 2. Now press

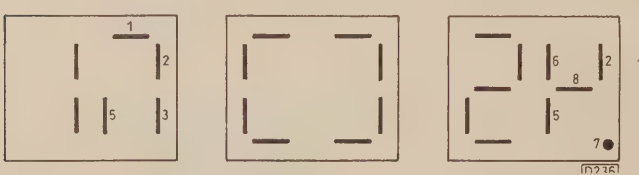


Fig. 1 (left): Option one. Fig. 2 (centre): Brackets (memory). Fig. 3 (right): Option two.

volume up to get to step two. The display should be as shown in Fig. 3. Use the handset buttons to make any corrections required. When the display is correct, press the memory button. The brackets will reappear.

(4) Press volume up again to get to option three, see Fig. 4. Correct any errors and press memory. The brackets will be back.

(5) Press volume up for option four. If the display is not as shown in Fig. 5 correct it with the buttons. Press the memory button then exit the service mode by pressing standby on the handset. This completes the basic programming.

(6) With teletext sets there are two more settings to be carried out before you leave the service mode. After memorising option 4, press the service button again. The display will be HP as shown in Fig. 6 and the set will go into the

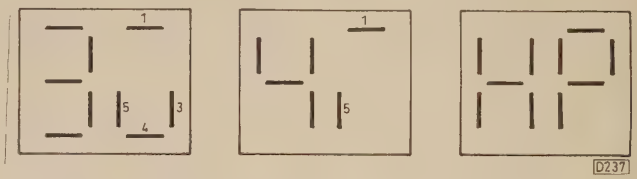


Fig. 4 (left): Option three. Fig. 5 (centre): Option four. Fig. 6 (right): Text position.

mixed (text and picture) mode. Using the volume buttons, centralise the text field at the top of the screen. When satisfactory, press the memory button.

(7) The last operation is text contrast. Press the service button: the display will be CO as shown in Fig. 7. Use the volume buttons to set the text contrast. Then press memory to get the brackets. Finally exit the service mode by pressing the handset's standby button. You may have to carry out the text contrast adjustment a couple of times as it's difficult to judge this with a mixed display.

When the set is switched on again all should be well. Test all functions with the remote control unit, including teletext. If any don't work properly, recheck the settings in the service mode. If some information hasn't been stored the MDA2062 memory chip may be faulty, but it's worth going through the reprogramming procedure a couple of times as the information doesn't always get written in.

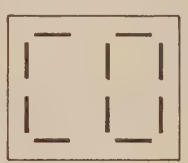


Fig. 7: Text contrast.

If you have an old ITT or Granada handset it may be worth fitting a switch to it to save having to take the customer's handset to pieces. Most remote control units that have an SAA1250 chip seem to be suitable.

General Service Notes

The h.t. should be set (R811) for 115V at TP13 (junction of C813/L803).

A chopper power supply with a TDA4601B control chip (IC800) is used. The usual cause of power supply failure where the BU508A chopper transistor Q800 has gone short-circuit is that R809 (270kΩ) has gone high in value or open-circuit. When Q800 goes short-circuit the 2·7Ω, 4W surge limiter resistor R801 will almost certainly have gone open-circuit. As a matter of course we also replace the following electrolytic capacitors: C809 100μF, 25V; C810 100μF, uprating it from 16V to 25V; C819 100μF, 16V; and C820 1μF, 100V.

The h.t. preset R811 (4·7kΩ) can cause width fluctuations. R605 (5·6kΩ, 4W) in the h.t. feed to the line driver stage can fail, giving the sound but no raster symptom. Dry-joints around the chopper and line output transformers are common.

The chassis used in this model is sometimes referred to as the Indiana 100. It's used in a number of other sets including the Bush 2514, 2514T, 2515, 2515T, 2520, 2520T and 2521 (models with suffix T have teletext); the Alba CTV704, CTV744 and CTV752; the NEI 1451R, 1451TX, 1551TX, 2131R and 2131TX; and the Perdio P1408, P2004, P2005, P2101 and P2102.

Back to Basics

Steve (centre) with some of his recent weekend VCR servicing course students.

It's easy for those of us who spend many bench hours coping with Joe Public's assorted sick VCRs to mistake practical experience for basic knowledge – until we are confronted with a baffling fault symptom that calls for theoretical reasoning before we start on the practical repair.

That may sound a bit pompous, which Steve Beeching is not. Five of us discovered this in July when we attended a weekend VCR training course arranged and conducted by Steve near his home at Barnby in the Willows, Notts. Barnby boasts a phone box, a friendly inn called The Willow Tree and a village hall, once a schoolroom, where the course sessions were held. The accompanying photograph shows Andrew, Roy, Phil and Alan with Steve in the middle – now you know what he looks like. Me? – just behind the camera.

Packing video information on to a slow-moving tape is one thing, packing all that theory into a slow-moving brain like mine without head saturation is something else. But with Steve's expert and entertaining tuition we all managed to improve our grey cell tracking. The concentrated coverage included tape track patterns, f.m. and luminance signal recording, colour recording/playback, servos, systems control, tape transport and hi-fi sound. This rich diet was washed down with welcome cups of coffee provided by Steve's wife Elaine, while lunch breaks were sandwiches at The Willow Tree.

Saturday evening was 'half term', when brain bashing was relieved by an excellent fine-weather barbecue provided by Steve and Elaine at Grove Farm. This included an opportunity to inspect the workshop where camcorders and VCRs surrender their faults.

We all have gaps in our knowledge – mine are chasms – and few would find that they had nothing to learn on Steve's courses. A customer complains about bent, wobbly pictures when he views hired tapes. Yes, he's not using his TV set's AV channel: but are you sure why a shorter line sync time-constant is necessary for VCR use, and why there is usually no problem with a machine's own recordings? These and many other mysteries were solved during the course. I now have a much lower IQ (Ignorance Quota).

A few hours spent with Steve is more profitable than weeks of inefficient bench work. At £50 the weekend was an excellent investment. I recommend it! **C.A.**

Solution to Test Case 374

– see page 253 –

Nobody could accuse the Ferguson TX9 chassis of being complicated, certainly not in its colour output amplifier and tube drive department. The RGB outputs from the colour decoder chip are d.c.-coupled to simple class A output stages and then go via 2·7kΩ flashover protection resistors to the tube's cathodes. Dylon, by now thoroughly demoralised, was left wondering where he'd gone wrong in his diagnosis with this most basic of colour-tube drive circuits.

Perusal of the circuit diagram and the manual's parts list which, unusually and very helpfully, gives the functions of all the components finally provided the answer. There are three video signal clamps within the TDA3560 chip, one each for the R, G and B channels. The clamp voltages are stored by separate 0·1μF capacitors, C68, C65 and C64 for R, G and B respectively. C68 was faulty of course, a replacement providing a complete cure – once the gain and background presets in all three channels had been set up.

Even then the long-suffering Dylan was not quite through. Now that the drives were present in full measure there was a distinct lack of contrast despite the tube rejuvenation. But we won't turn this into Test Case 374b. The cause of this symptom was R263 (820kΩ) in the beam-current limiter circuit – it had gone high in resistance value. By the time that Dylan had finished with the set the lovely Anne Diamond had long since departed from the screen. The early evening newsreader looked o.k. though.

Satellite Scene

Contributions from David Finan, Steve Cannon, Chris Watton and Graham Rees

Amstrad SRX200 Tuning Modifications

The following modification, which is made to the remote control unit and not the receiver itself, enables the Amstrad SRX200 to tune through all 48 channels. When the remote control unit is opened you'll see a D6121G502 chip as shown in Fig. 1(a). Solder leads to pins 4 and 14, and another one to the adjacent resistor R3, as shown. A suggested colour coding is also shown. Next drill two small holes in the base of the remote control unit and fit two small touch switches. I used two switches from an old Sony C5 VCR. Connect them to the

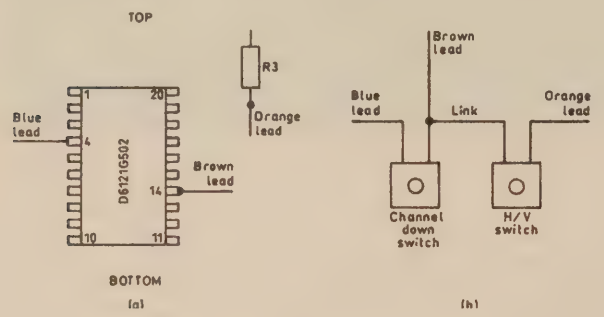


Fig. 1: Modification to the Amstrad SRX200's remote control unit to enable the receiver to tune through all 48 channels.

previously added leads as shown in Fig. 1(b).

Because of its original design, channels 17-48 are of opposite polarity to that selected automatically by the receiver. This is why the additional H/V button has to be pressed. You will find that channels 32 (1,685MHz) and 33 (965MHz) cannot be obtained: the receiver will pull these in however if the H/V button is not pressed. When this modification is carried out the channel frequency (less 10GHz) is displayed by the receiver.

It's also easy to modify these receivers to enable the 'out-of-band' channels 62 (RTL5) and 61 (Filmnet) to be selected. This is done by adding a switch and 47kΩ preset as shown in Fig. 2. When the switch contact is linked to R120 normal channel selection is obtained. With the switch in the other

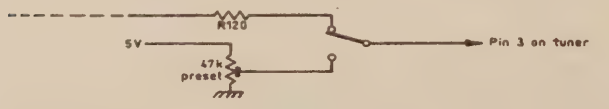


Fig. 2: Modification to enable the Amstrad SRX200 to select channels 61 and 62.

position, adjust the 47kΩ preset for an RTL5 picture (make sure that the H/V lamp is lit). A press on the H/V switch should then bring in Filmnet – scrambled of course, but you can hear the sound! **D.F.**

Fault Reports

Philips STU802: One of these receivers came to us because it was dead. On inspection we found that the power supply's 5V output was low at 3V. As all the other outputs were o.k. we came to the conclusion that something was loading the 5V line, but a 5V reading could be obtained only with no load at all connected. Although there was no ripple on the line we replaced the 2,200µF smoothing capacitor C15. This provided a complete cure.

Another STU802 was sent to us with a report that there was "no picture and the power supply whined". Checks on the outputs at the secondary side of the power supply suggested that it was working all right, but the whining did seem to come from this area where quite a bit of work had been carried out. I thought it best to eliminate the whining first. After replacing D8 and D9 (both type 1N4148) the power supply worked without making any noise at all and, lo and behold, we had sound and a picture as well. These two diodes provide supplies for the power supply chip. They read o.k. out of circuit, but presumably one or other of them was breaking down under load and causing misoperation of the chip. **S.C.**

Amstrad SRD510: This dead IRD had a blown power supply. A fair crop of parts was required to put it right – IC600 (3284), C612 (220µF), C613 (1nF), C611 (1µF, 50V), TR600 (MJF18004), R610 (2·2Ω), R609 (4·7Ω), R604 (2·2Ω), R602 (47kΩ) and R601 (10Ω). Quite a bang, but the fuse hadn't blown. The joints around the chopper transformer didn't look too great: perhaps this was the reason for the mass destruction. **C.W.**

Pace SS9200: The customer's complaint was of poor video, with pulling and cogging. Scope checks showed that the video waveform was o.k. from the tuner to the emitter of Q29, but there was virtually no waveform at the modulator's video input. The only component between these two points is the 10µF electrolytic C163. Close examination showed that during manufacture it had been inserted the wrong way round. A replacement put matters right – the capacitor had taken eighteen months to break down. **G.R.**

Pace PRD800: This receiver wouldn't tune in any stations and had Sky One on every channel with vertical polarisation. As resetting the microcontroller chip didn't have any effect I monitored the voltage at pin 15 of the tuner (Mod 1) and found that it didn't vary when I scanned through the tuning. This tuning voltage comes from pin 16 of chip U9. A new chip cured the fault. **G.R.**

Amstrad SRD400: The customer complained that he couldn't store any of the new channels on the lower numbers. The channels could be tuned in, but not stored. As a first step I checked the supply at pin 8 of the SDA2516 channel memory chip IC104. There should be 5V here but the reading was zero. I then realised that the chip had been inserted the wrong way round during manufacture. Putting it in the right way round cured the fault. **G.R.**

Pace SS9200: The customer complained that there were "no pictures". A check on the outputs from the power supply showed that they were all about 30 per cent low. This suggested that there was a fault on the primary side of the supply, so I started to check the various components here. All but one read correctly. The reading I obtained with R13 was 0·8Ω, but as my meter is not too reliable at such a low value I didn't think much of it. After a lot of other component checks I rang Pace Technical who advised me to treble check R13. As I obtained a reading of 0·5Ω with a new component I replaced the resistor in the receiver. It then worked all right, with all the voltages correct. **G.R**

Letters

CUSTOMERS

The owner of an Amstrad TVR3 came into the workshop requesting a second opinion after being quoted about £85 plus VAT to repair his set, the problem being that when a tape was inserted the machine would immediately go into the play mode, no other function being possible. There's a switch marked 'repeat' at the back and it was in the 'on' position. Simply flicking it to 'normal' cured the problem – the switch provides continuous playback of tapes such as advertisements etc. if required. The customer was delighted that his equipment wasn't faulty, but argued about paying a token charge of £5.

When he'd left the workshop I thought it a pity that Carlton Television hadn't been present. Mind you it wouldn't have been newsworthy to film Joe Public getting the skilled, cheap, excellent service this trade provides. For anyone wondering why £5 was charged for flicking a switch, the flick took three seconds but it then took twenty minutes to explain to the owner what had happened – he just couldn't accept the reason for the switch – followed by five minutes spent haggling over the fiver! Like you, I'm in business to make an honest living. Many more like that customer and I'll call it a day.

When he was well clear I phoned the dealer who'd given him the quote. Apparently it was given over the phone because the 'customer' had insisted that any competent engineer should know what was wrong with the equipment without looking at it: after a long conversation that was getting nowhere he'd been given the figure to get him off the phone.

John Edwards,
Welling, Kent.

A local lady came into the shop recently with a modern Hitachi VCR for repair. We gave it a service then phoned her to say that it was ready. While we had it we discovered that the lady worked for a high street multiple where all kinds of electrical goods and cameras, along with computers and everything else, are sold (for nothing) and serviced. When our customer returned we quizzed her as to why she hadn't taken the video to her own place of work, where she'd actually bought it. Her reply was instant: "Good God man, do you think I could afford the prices they charge?"

Chris Watton,
Boston, Lincs.

A FAX REPAIR

After a letter of mine complaining about the high cost of some companies' service manuals was published some months back I was contacted by several engineers with offers of help. They also agreed with my views. By that time I'd already obtained a second-hand manual for the Amstrad FX9600T fax machine. For the benefit of other engineers who may find one of these machines on the bench, here are the details of what is apparently one of its most common faults.

The power supply board seems to work for a couple of years or so then fails to start up again when mains power has been switched off for a while. It can be started by placing a hairdryer or fan heater near the back of the machine, where the PSU resides. Sometimes the power supply will hunt, lighting various LEDs and producing messages on the display, before springing to life. Once in operation it will continue to work until the next power cut. A replacement power supply PCB, which was available from Amstrad stockists for around £30 until a short while ago, would have been the easy answer. But it has now been declared obsolete. It would have been a shame to write off such a modern machine with so many useful functions because of lack of spares, so I decided to try to repair it.

A look at the chopper power supply circuit revealed a number of components that could cause failure to start up. The cause of the fault was eventually traced to C7 (220µF), which is very close to the main transformer. As the transformer runs quite warm, it had obviously dried out the electrolytic whose value had fallen by over fifty per cent. Replacing C11 (10µF) and any other small electrolytics while they are accessible is a good idea. The larger smoothing electrolytics don't seem to be affected by the heat generated nearby.

All FX9600 range machines (T/AT/TP/ATP) seem to use this power supply.

Mike Goodall,
Littleport, Cambridgeshire.

SATELLITE RX MODIFICATION

The circuit shown in Fig. 1 is a modified version of the one devised by David Finan (November issue, page 43) for adding extra sound channels with Amstrad SRX100/200 satellite receivers. With the original version the receiver powered up in the new mode each time so that the user had to operate the TV/SAT button to obtain the normal sound channels. The reason for this is that the TV/SAT LED (used to control the added board) always powers up with the LED alight. The revised circuit overcomes this disadvantage by some rearrangement of the gates – the control signal is diverted to a nand gate that controls the receiver's internal oscillator and is inverted to switch the added on-board oscillator.

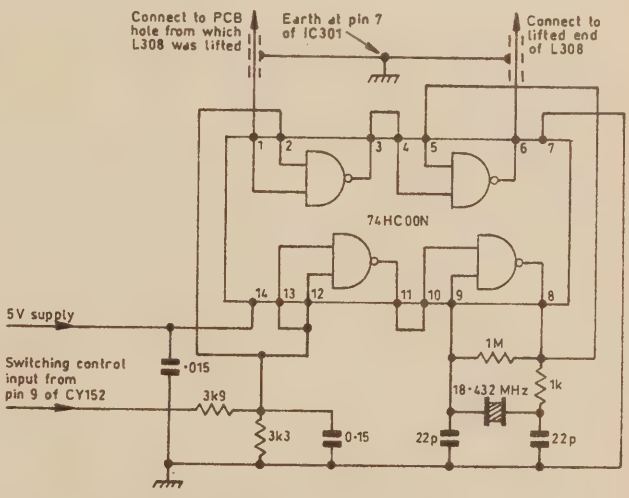


Fig. 1: Amstrad SRX100/200 modification

Allan Mitchell,
Enfield, Middx.

ASBESTOSIS

I am helping an elderly lady who has contracted an asbestos disease and believes that her work at GEC in

Coventry in the late Fifties may have exposed her to asbestos. One of her jobs was TV receiver assembly. I am keen therefore to hear from any readers who are familiar with the internal construction of TV sets manufactured by GEC in Coventry between 1956 and 1960 and could possibly confirm whether or not the sets ever contained asbestos-based thermal or electrical insulating material and, if so, where such material was located. Both asbestos-based composites and woven or fibrous material are of interest. Another point of interest is whether any other ex-GEC, Coventry employees have been diagnosed as suffering from asbestos-related diseases. The cost of photostats of any relevant manuals, parts lists etc. would be refunded. I can be reached on 0742 586 899 (answer-phone) or the address below.

Seb Schmoller, 312 Albert Road,
Sheffield S8 9RD.

LES LAWRY-JOHNS

It was with incredulity that I read the obituary to Les Lawry-Johns in the December issue. Although I'd never seen, spoken or corresponded with him his death feels like that of a close acqaintance. His name first came to my attention when, as a young boy, I came across his book *Radio Repair: Questions and Answers* in my local Public Library. It was the first and, in my opinion, only book I've come across that provides a truly practical, down-to-earth treatment of the subject: its subtle humour brings the subject to life. I sensed in the author a kindred spirit, and saved over two months of my pocket money to buy myself a copy.

My interest in such matters was stirred and, nearly ten years later, as a medical student with a keen interest in audio-visual servicing I still use the book as a source of inspiration when my repair efforts come to a dead end. Although by the time I started to read *Television* Les no longer contributed regularly, imagine my delight when a friend lent me some back issues and I was able to read in his column about the day-to-day antics of this legendary figure of my childhood. His humorous, amiable character made a change from the 'we don't fix those any more' attitude that so often prevails today. He will be sorely missed, but his name and larger-than-life personality will undoubtedly live on.

Edmond Aviglia,
Birmingham.

Editorial note: We have received a number of letters from readers who found Les's articles a source of enlightenment, amusement and inspiration. He cheered us all up no end.

HAMEG REPAIRS

We feel that we must reply to the letter from Roger Burchett in your November issue. It gave a simplified account of what happened and was in places factually inaccurate. We also feel that it was unfairly critical of our practices.

The repair to which Mr. Burchett refers was sent to us back in June 1987. We advised him that an investigation charge of £30 would be applied if he decided, following our fault investigation, not to have his oscilloscope repaired – such a charge simply reflects work already carried out. Our estimate consisted of £30 for parts, £30 for labour, £30 for a full calibration to manufacturer's specification plus £11 for return carriage. Mr. Burchett declined to go ahead and was charged only the £30 investigation charge, Hamig having waived the carriage and storage charges.

It is our policy to carry out complete recalibration after every repair. This ensures that the many thousands of satisfied Hameg scope users can depend on their equipment always meeting its full specification, our aim being to provide our customers with a quality service. Mr. Burchett's repair would not have included complete recalibration.

We hope that this letter will make our viewpoint clear to your readers.

Hameg Instruments Ltd.,
Luton, Beds.

CITY AND GUILDS REPLY

A recent letter from Darren Coyle of Derry, Northern Ireland made some critical comments about the City and Guilds Certificate in Electronics Servicing (224). According to Mr. Coyle he was told during an interview for a job that his City and Guilds qualifications were not recognised and were considered to be 'Micky Mouse' qualifications. At the same time he praised the college course he took as being one of the best he has come across – a curious contradiction. Mr. Coyle also suggested that City and Guilds needs to market its qualifications to employers more.

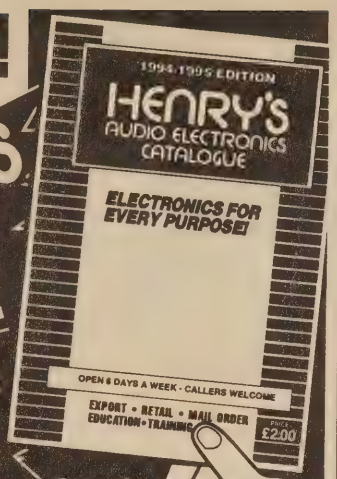
The City and Guilds Electronics Servicing certificate, which is available at three levels, was developed specifically for the electronics servicing industry and is widely recognised as being the most relevant qualification for those who want to make a career out of servicing radio, television and electronic equipment. Trainees from companies such as Mastercare and Homeserve, which provide servicing for major high street stores, are sent to colleges to gain this qualification. Having spoken to the personnel departments at several electronics firms, including one in Derry, Northern Ireland, I feel that the job Darren Coyle may have applied for required higher level qualifications than City and Guilds at Level 3 – maybe an HND or a Degree in Electronics. In this case his City and Guilds qualification would not have been appropriate. But to say that the qualifications are considered to be 'Micky Mouse' is an extremely sweeping statement: our research indicates exactly the opposite.

With respect to marketing, while we do market our qualifications to employers – market research indicates that there is almost 100 per cent awareness of City and Guilds amongst employers – inevitably we cannot reach everyone and some people may be misinformed about the range and quality of the qualifications we offer.

Anne Nicholls,
Marketing and Public Relations Department,
City and Guilds.

Published on the third Wednesday of each month by Reed Business Publishing Ltd, Quadrant House, The Quadrant , Sutton, Surrey SM2 5AS. Filmsetting by Marlin Graphics, 2-4 Powerscroft Road, Sidcup, Kent DA14 5DT. Printed in England by BPCC Magazines Division, Carlisle Web Offset, Cumbria. Distributed by IPC Marketforce, Kings Reach Tower, Stamford Street, London SE1 9LS (071 261 5000). Sole Agents for Australia and New Zealand, Gordon and Gotch (Asia) Ltd.; South Africa, Central News Agency Ltd. "Television " is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed by way of Trade at more than the recommended selling price shown on the cover, excluding Eire where the selling price is subject to currency exchange fluctuations and VAT, and that it shall not be lent, resold, hired or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.

OUT NOW!!



HENRY'S NEW 1994 COLOUR CATALOGUE

TRADE • EDUCATION
RETAIL • MAIL ORDER
EXPORT

Open 6 days a week - CALLERS WELCOME

RETAIL - MAIL ORDER VERSION
With price lists, special offers and purchase vouchers. Send PO/Cheque £4.00 (UK) £6.00 (EC) £10.00 (Non EC) Callers £2.00.

Education, trade, quantity purchasers
Post or fax letterhead for ***FREE*** copy with trade/quantity price list (UK).
Overseas prices as above.

HENRY'S
404 Edgware Road,
London W2 1ED

Components
Telephone: 071-723 1008

Security - Communications
Telephone: 071-724 0323

Audio and Test Instruments
Telephone: 071-724 3564

Trade/Quantity
Telephone: 071-258 1831
Fax: 071 724 0322

WE HAVE THE WIDEST CHOICE OF USED OSCILLOSCOPES IN THE COUNTRY

TEKTRONIX 7000 SERIES OSCILLOSCOPES
Dual Trace Plug-in with TB from £200. Many Plug-in options available. 4 Traces; Differential etc. Plug-ins sold separately.

Tektronix 2235 Dual Trace 100 MHz Delay Sweep £800
PHILIPS 3065 – 2 + 1 Channels. 100MHZ Dual TB Delay Sweep £700
TEKTRONIX 475 Dual Trace 200MHZ Delay Sweep £550
H.P. 1722B Dual Trace 275MHZ Delay Sweep £550
H.P. 1715A Dual Trace 200MHZ Delay Sweep £500
TEKTRONIX 465 Dual Trace 100MHZ Delay Sweep £450
TEKTRONIX 2215 Dual Trace 60MHZ Delay Sweep £450
PHILIPS PM3217 Dual Trace 50MHZ Delay Sweep £400
HAMEG 605 Dual Trace 60MHZ Delay Sweep £400
TELEQUIPMENT D83 Dual Trace 50MHZ Delay Sweep £200
HITACHI V422 Dual Trace 40MHZ £325
IWATSY SS5705 3 Channel 40MH2 Delay Sweep £400
TRIO CS1830 Dual Trace 30MH2 Delay Sweep £300
KIKUSUI 5530 Dual Trace 30MHZ £180
GOULD OS1100 Dual Trace 30MHZ £160
HAMEG 2036 Dual Trace 20MHZ Compdnent Tester £260
GOULD OS300 Dual Trace 20MHZ £200
GOULD OS2508 Dual Trace 15MHZ £125
TEKTRONIX 466 Dual Trace 100MHZ Storage £450

THIS IS JUST A SAMPLE – MANY OTHERS AVAILABLE

PHILIPS PM5193 Programmable Synthesiser/Function Generator 0.1MHZ-50MHZ IEEE-488 As new £1500

MARCONI 2019 Synthesized AM/FM Sig Gen 80KHZ – 1040MHZ £2000
MARCONI 2018 Synthesized AM/FM Sig Gen 80KHZ – 520MHZ £950
EIP/DANA 351D Microwave Frequency Counter 20HZ – 18GHZ £950
RACAL 9921 Frequency Counter 3GHZ £300
RACAL/DANA 1991 Nanosecond Universal Counter £800
RACAL 9302 RF Millivoltmeter True RMS 10KHZ 1.5GHZ £450
RACAL 9301A RF Millivoltmeter True RMS 10KHZ – 1.5GHZ £300
RACAL 9009 Automatic Mod. Meter 10MHZ – 1.5GHZ Wide Deviation £250
H.P. Pulse Generator type 214B £750
LYONS PG73N Pulse Gen. PRF 1HZ – 20MHZ £150
GOULD Biomation K500D Logic Analyser £300
FARNELL PSG520H Synthesised Sig Gen AM/FM 100KHZ-520MHZ £600
LEADER LSG216 AM/FM Sig Gen 2 ranges 0.1 + 30MHZ & 75-115MHZ £400

SPECTRUM ANALYSERS

HP 141T with 8555A & IF plug-in 10MHZ-18GHZ £1800
HP 141T with 8554B & 8552B 500KHZ-1250MHZ £1300
HP 140T with 8554L & 8552A 500KHZ-1250MHZ £1000
HP 141T with 8556A & 8552B 20HZ-300KHZ £1000
HP 140T with 8553L & 8552A 1KHZ-110MHZ £800
HP 182C with 8558B 100HZ-1500MHZ £1500
HP 3582A 0.02HZ-25.5KHZ £2000
MARCONI TF 2370 1KHZ-110MHZ £1500

FARNELL ISOLATING TRANSFORMERS GU500 240V 500VA, un-used £50
Isolating Transformer 500VA, uncased £30

DATRON 1061A – 6½ digit Autocal Multimeter with True RMS AC/Current £1250
DATRON 1065 – 5½ digit Autocal Multimeter, AC/DC/Ohms with IEEE £600
HEWLETT PACKARD 3490A Bench Multimeter. 5½ digit AC/DC/Ohms £200
PHILIPS PM2534 Multi Function DMM 6½ digit with GPIB/IEEE £450
SOLARTRON 7150 – 6½ digit. DMM with IEEE £400
MARCONI Digital Frequency Meter 2430A 10HZ-80MHZ £125
MARCONI Digital Frequency Meter 2431A 10HZ-200MHZ £150
MARCONI Universal Counter Timer 2437 DC-100MHZ £175
MARCONI Universal Counter Timer 2438 DC-520MHZ £225
BLACK STAR Jupitor 500 Sine/Sq/Tri 0.1HZ – 500KHZ £70
FEEDBACK FG600 Sine/Sq/Tri 0.01HZ – 100KHZ £60
HP3311A Function Generator 0.1HZ-1MHZ. Sine/Sq/Tri £125
MULTIMETERS Handheld. M2355-32 ranges AC/DC 10Amps. Diode/Transistor Tester. Freq. Counter £32.50

FARNELL Electronic Load RB1030-35 1KW 30Amp 35 Volt £600

HP 8690B Sweep Osc with 86974 Plug-in. 26.5-40GHZ £300
RACAL/DANA RF Power Meter 9104 ..... £400
RACAL/DANA 9341 Databridge Automatic L.C.R & Q £350
WAYNE KERR B905 Automatic Precision Bridge 0.05% £900
WAYNE KERR B424 Digital Component Meter, LCR £125
WAYNE KERR B605 Automatic Component Bridge 0.1% £350
FARNELL PSU TVS70Mk2, 70V 5A/30V 10A £300
FARNELL PSU H60/25 0-60V; 0-25 Amps Metered £400
FARNELL PSU L30E 0-30V; 0-5 Amps Metered £80
FARNELL B30/20 0-30V, 20 Amps £250
FARNELL B30/10 0-30V; 10 Amps £200
H.P. 6255A 0-40V; 0-1.5 Amps Twice. Metered £130
H.P 6209B 0-320V; 0.0.1 Amps Metered £125
MARCONI TF2700 Universal LCR Bridge. Battery from £150
AVO Valve Characteristic Meter VCM163 ..... £300
FARNELL LA520 RF Power Amp. 1.5-520MHZ 300mW £175
RACAL 9100 Absorption Wattmeter 1MHZ-1GHZ 3W £100

NEW EQUIPMENT

HAMEG OSCILLOSCOPE HM1005 Triple Trace 100MHz Delay Timebase £847
HAMEG OSCILLOSCOPE HM604 Dual Trace 60MHz Delay Sweep £653
HAMEG OSCILLOSCOPE HM203. 7 Dual Trace 20MHz Component Tester £362
HAMEG OSCILLOSCOPE HM205. 3 Dual Trace 20MHz Digital Storage £653
All other models available – all oscilloscopes supplied with 2 probes

BLACK STAR EQUIPMENT (P&P all units £5)
APOLLO 10 – 100MHz Counter Timer Ratio/Period/Time interval etc £222
APOLLO 100 – 100MHz (As above with more functions) £325
METEOR 100 FREQUENCY COUNTER 100MHz £119
METEOR 600 FREQUENCY COUNTER 600MHz £145
METEOR 1000 FREQUENCY COUNTER 1 GHz £189
JUPITOR 500 FUNCTION GEN 0.1Hz-500kHz Sine/Sq/Tri £119
ORION COLOUR BAR GENERATOR Pal/TV/Video £229
All other Black Star Equipment available

OSCILLOSCOPE PROBES Switchable × 1 × 10 (P&P £3) £12

Used Equipment – Guaranteed. Manuals supplied if possible.
This is a VERY SMALL SAMPLE OF STOCK. SAE or Telephone for list. Please check availability before ordering.
CARRIAGE all units £16. VAT to be added to Total of Goods and Carriage.

STEWART of READING
110 WYKEHAM ROAD, READING, BERKS RG6 1PL
Telephone: 0734 268041 Fax: (0734) 351696
Callers Welcome 9am-5.30pm Mon-Fri (until 8pm Thurs)

TUBES

NEW 14″ narrow neck portable tube £49

NEW 14″ wide neck portable tube ..... from £29

NEW 17″ narrow neck portable tube FST.....£89

NEW 21″ narrow neck tube FST.....£79

NEW 25″ tube FST.....£189

NEW 28″ tube FST.... from £189

We offer a wide range of guaranteed re-gunned tubes, also manufacturers 'B' grade. Also in stock a large quantity of ex-equipment tubes (salvaged from new and used sets).

Ring IRENE or JANE for friendly, helpful advice.

Carriage and VAT extra

EXPRESS TV

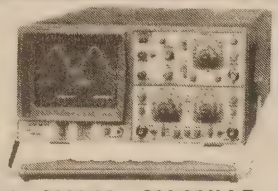
The Mill, Mill Lane,
RUGELEY, Staffs WS15 2JW
Tel: 0889-577600
Fax: 0889-575600

HOW TO INCREASE YOUR PROFITS, IMPROVE YOUR SERVICE, WITH COST EFFECTIVE TEST EQUIPMENT.

HAMEG OSCILLOSCOPES

HAMEG are Europe's top selling **DUAL TRACE OSCILLOSCOPES**. Select from four superb models. All, with the exception of the HM 1005, incorporate a useful **COMPONENT TESTER**. Size - all models - 285mm x 145mm x 380mm. Clear display 8cm x 10cm. Mains supply: 110/220.240V AC 50/60Hz.
All supplied with **2 PROBES, a COMPREHENSIVE MANUAL** and a **2 YEAR WARRANTY**.

HM203-7 20MHz STANDARD

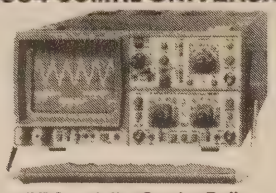


SPECIFICATION
* 2 Channels
* Bandwidth: DC - 20MHz
* Sens: Ch.1, Ch.2, 1mV/cm
* Timebase: 0.1s - 20ns/cm
* Triggering: DC - 40MHz
* Active TV - Sync - Separator
* Variable hold-off
* Trigger LED indicator
* Calibrator: 1KHz Square wave
* Component tester
* Plus many features

Price £362.00 + £63.35 V.A.T. **FREE Specialist Carrier Delivery**

HM604 60MHz UNIVERSAL

SPECIFICATIONS
* 2 Channels
* Bandwidth: DC - 60 MHz
* Sens: Ch.1, Ch.2, 1mV/cm
* Timebase : 2.5s - 5ns/cm
* Triggering: DC - 80MHz
* Active TV - Sync - Separator
* After delay trigger
* Sweep delay
* Delay line
* Trigger LED indicator
* Calibrator: 1KHz & 1MHz Sq. Wave
* Component tester



Price £653.00 + £114.28 V.A.T. **FREE Specialist Carrier Delivery**

HM1005 100MHz UNIVERSAL

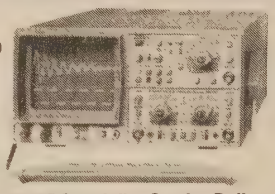
3 CHANNELS - UP TO 6 TRACES

SPECIFICATION
*3 Channels
* Bandwidth: DC - 100MHz
* Sens: Ch.1, Ch.2, Ch.3, 1mV/cm
* Timebase A: 2.5s - 5ns/cm
* Timebase B: 0.2s - 5ns/cm
* Triggering DC - 130MHz
* After delay trigger
* Delay line
* Trigger LED indicator
* Overscan LED indicator
* Active TV - Sync - Separator
* Calibrator: 1KHz & 1MHz Sq. Wave

Price £847.00 + £148.23 V.A.T. **FREE Specialist Carrier Delivery**

HM205-3 20MHz DIGITAL STORAGE

SPECIFICATION
* Digital Storage
* Analogue real time (Same as 203-7)
* Bandwidth: DC - 20MHz
* Sens: Ch.1, Ch.2, 1mV/cm
* Timebase Digital: 5s-1μs/cm
* Triggering DC - 40MHz
* Active TV - Sync - Sampling
* Max sampling rate: 2 x 20MHz
* Memory: 2 x 2048 x 8 Bit
* Dot joiner
* Printer/plotter output



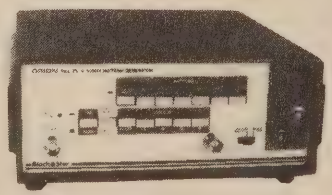
Price £653.00 + £114.28 V.A.T. **FREE Specialist Carrier Delivery**

BLACK STAR COLOUR PATTERN GENERATOR

THE 'ORION' THREE-IN-ONE
PAL VHF/UHF - PAL VIDEO COMPOSITE - R.G.B.

The Orion is a compact, bench instrument offering a wide range of patterns and facilities at a truly low cost.
In addition to a switchable sound carrier facility which allows use with the majority of PAL TV systems, the Orion provides highly flexible TGB outputs, ensuring compatibility with most video monitors.
More than 50 pattern combinations can be selected, including those for testing static and dynamic divergence, video amplifier linearity, colour purity, general colour performance, focus etc.
A separate video input to modulate camera signals; fully variable RF and video output levels facilitating AGC testing; trigger output allowing easy triggering of difficult oscilloscope waveforms; external sound modulation input via DIN connector for frequency response testing of TV sound systems; adjustable wide frequency coverage of VHF and UHF TV bands.
Indispensible in the manufacture, test, and servicing of televisions, and computer and video monitors.

FEATURES
* Colour bars, purity, greyscale, crosshatch, dots, focus, etc.
* VHF/UHF Channels.
* 5.5MHz, 6.0MHz, 6.5MHz Sound Carriers.
* Internal/External Sound.
* External Video Output.
* Trigger Output.
* PAL B,D,G,H,I,K.
* Separate R, G, B and sync. O/P's.
* RGB $\cdot\alpha$ TTL & 1V.
* Green + 0.3V Syncs.
* Composite Video Output.
* Variable RF/Video Output.
* Switchable Video Polarity.
* Mains powered 220/240V AC 50/60Hz.
* Size: 98 x 219 x 240mm.



Price £229.00 + £40.08V.A.T.

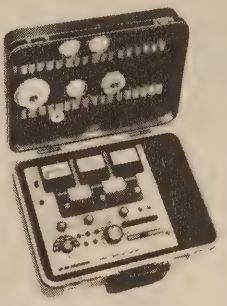
NEW! DEGAUSSING COIL

A very effective degaussing coil, ideal for degaussing TV tubes, computer monitors, oscilloscopes etc.
Mains Power: 220/240 50/60Hz.
Size: 355 x 355 x 24mm.

Price £46.00 + £8.05V.A.T.

B & K PRECISION CRT ANALYSER-RESTORER

The number one CRT Test Instrument. Over 5000 U.K. Television engineers wouldn't be without it.



*** All CRT's checked identically, including all in-line and one gun types * Tests all three guns of colour CRT's simultaneously under actual operating conditions (model 490) * Exclusive multiplex technique (model 490) * Measure true dynamic beam current that actually passes through G1 aperture to screen * Measures all shorts and leaks - preserving more CRT's * Tests focus electrodes lead continuity finding faults that other testers miss *Uses most powerful restoration method known with minimum danger to CRT * Rejuvenated CRT's guaranteed as new for two years * Obsolescence proof - perpetual set up chart updated and new adaptors developed * Tests and rejuvenates VDU's and oscilloscope tubes * A range of over 40 CRT base adaptors available * Increase profit * Pays for itself in months.**

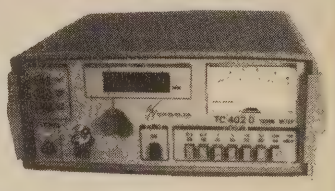
Prices
Model 490 Tri-dynamic three meter instrument inc. 6 common adaptors..... **£559.00 + £97.83V.A.T.**
Without adaptors..... **£496.00 + £86.80V.A.T.**
Model 480 Single meter instrument inc. 6 common adaptors..... **£425.00 + £74.38V.A.T.**
Without adaptors..... **£360.00 + £63.00V.A.T.**

SADELTA SIGNAL STRENGTH METERS

The Sadelta Field Strength Meters have been designed to facilitate the dish alignment of satellite TV systems and aerial alignment of VHF/UHF television and radio systems. Signal levels can be accurately measured on the TC402-D, TC90 AND TC80, allowing the evaluation of signal conditions for satisfactory operation. All models have a clear LCD direct frequency readout, coupled to a multiturn tuning control enabling precise channel identification.

TC402-D VHF & UHF

FEATURES
* Three bands:
  Low VHF: 45-170MHz
  High VHF: 170-450MHz
  UHF : 450-862MHz.
* Digital display for direct frequency readout.
* Built-in monitor loudspeaker AM/FM.
* Signal measurement from 20μV to 3V.
* Powered by eight 1.5V AA batteries.
* Fully portable with sturdy carrying case.



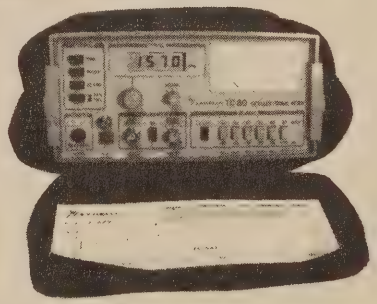
Price £289.00 + £50.57 V.A.T.

TC90 VHF-UHF- SAT.

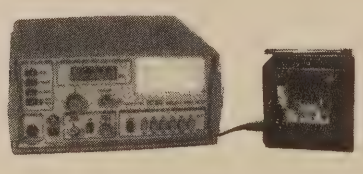
FEATURES
* Five bands:
  Low VHF : 45-110MHz
  High VHF : 110-300MHz
  Hyper VHF : 300-470MHz
  VHF : 470-862MHz
  Satellite : 950-1750MHz.
* Digital display for direct frequency readout.
* Signal measurement VHF/UHF 20μV to 3V.
* Signal measurement satellite -70dBm to -10dBm.
* Audible indication of satellite signal level.
* Built-in-monitor loudspeaker AM/FM (not satellite).
* Powered by rechargable battery (complete with charger 220/240V AC).
* Fully portable with sturdy carry case.

Price £499.80 + £87.47 V.A.T.

NEW! TC80 SATELLITE



TC-80 IN ITS STURDY CARRY CASE



TC-80, USING A LCD TV AS A MONITOR

The TC80 incorporates three unique features: video composite output; audio output with built in loudspeaker; ramp and RF signal outputs, which enable an oscilloscope to be used as a spectrum analyzer.

★ 4 digit LCD freq. display
★ Freq. range 950 to 1750MHz
★ Sweep mode sweeps entire freq. band for rapid satellite location
★ Tone select switch for audible tone proportional to signal strength
★ Measurement from 40 to 100dBuV
★ Audio demodulation with internal loudspeaker
★ Video demodulation
★ Rear SCART connector for A/V connection
★ Oscilloscope/spectrum analyzer output
★ Sound tuning 5 to 8MHz
★ LNC PSU 14V or 18V
★ LNC current measurement
★ Internal rechargeable battery with charger

Price £490.00 + £85.75V.A.T.

VISA

U.K. POST PAID, export enquiries welcome. Visa/Access or cheque with order, payable B. K. Electronics. Official Orders welcome from Govt. Depts., colleges, P.L.C.s etc. Large (A5) S.A.E. for technical leaflets of complete range. **Credit card orders are accepted by 'phone, fax or post.**
Delivery normally within seven days.

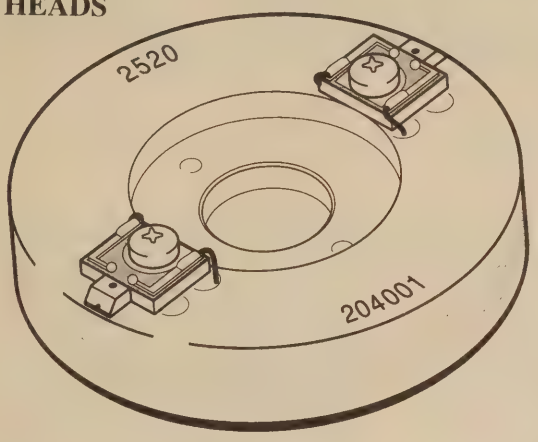
Access

B. K. ELECTRONICS
UNITS 1 & 5 COMET WAY, SOUTHEND-ON-SEA
ESSEX SS2 6TR
Tel.: 0702 - 527572 Fax.: 0702 - 420243

KÖNIG ELECTRONIC

QUALITY

VIDEO HEADS



IRWIN ELECTRONICS SERVICE

Trade Enquiries To:-
Unit 200, Albyn Complex, Burton Road, Sheffield S3 8BX
Phone: (0742) 739622/759909. Fax: (0742) 759909

COMPONENTS For TV ★ Video Audio ★ Computer

THIS IS JUST A SMALL SAMPLE OF STOCK
We can supply spares for many makes of equipment. WRITE (Encl. s.a.e. please) or PHONE FOR A 'PRICE & AVAILABILITY' on your requirements.
0452 526883

IC SELECTION

AN5753	£3.68	TA7280P	£4.99
BA6109	£1.95	TA7281P	£5.21
AY38912/P	£7.74	TA7288P	£3.59
BA4236L	£3.92	TA7324P	£2.69
BA5408	£2.90	TA7668BP	£1.89
BA6259N	£2.57	TA8400P	£4.95
CA741CE	£0.29	TA8410K	£4.97
CDP6818AE	£7.24	TBA530	£1.74
CNX62A	£3.55	TA7343AP	£3.49
DS1488N	£0.85	TBA810P	£1.16
DS75150N	£1.85	TBA810S	£1.62
DS75154N	£1.85	TCA940	£3.33
H11L3	£2.88	TDA1001B	£2.86
HA1137W	£3.61	TDA1020	£2.64
HA12006	£6.09	TDA1035T	£2.59
HA12413	£4.75	TDA1170D	£4.98
HA13007	£5.12	TDA1180P	£3.49
HD6845SP	£15.18	TDA1516Q	£4.63
KIA7217AP	£2.47	TDA1908A	£2.06
LA3160	£2.28	TDA2003	£2.44
LA3361	£1.79	TDA2541	£2.49
LA4480	£3.86	TDA2593	£3.45
LA7016	£2.99	TDA3653	£3.93
LA7910	£2.62	TDA4420	£2.71
LM1203N	£10.79	TDA4510	£3.75
LM733CN	£2.43	TDA4600-2	£2.95
LM833	£1.79	TDA4601	£2.49
MS4544L	£3.38	TDA4950	£2.15
MS4548L	£5.29		
MAB8461P	P.O.A.		
MAB8049H	£5.17		
MB81416-12	£4.99		
MK4564N	£2.45		
MP4504	£8.94	TDA8140	£3.49
MSM6242B	£11.77	TDA8170	£3.47
MC1377P	£7.32	TEA2000	£4.33
MC14502BCP	£0.78	TL431	£1.85
MEA2901	£2.69	UM6522	£6.99
NE555CDP	£0.29	UM8272A	£14.09
P8255A	£2.85	UPC1277	£4.23
PC713V	£2.99	UPC1378H	£2.45
SAA1124	£3.88	UPC1397C	£3.94
SED9420CAC	£15.68	UPD8039LC	£12.39
STK4332	£5.71	ZX8400APS	£4.63
STK5451	£6.29	14DN476G	£19.25
STK5482	£6.99	27C256-200	£2.98
TA7226P	£3.76	4116-2N	£1.89

MANY MORE FROM STOCK

IC PROTECTORS (F or N Ranges) each £0.79

SPECTRUM & QL CHIPS ★ SPECIAL OFFER ★

			(1+)	(5+)
TMS4532NL4	DRAM	(Spec)	£0.99	£0.89
ZX8302	ULA	(QL)	£6.49	£4.99
ZX8401	ULA	(Spec)	£5.44	£4.89
40054	ROM	(+2)	£11.69	£9.99
74LS00	TTL	(QL)	£0.15	£0.10
74LS157	TTL	(Spec)	£0.30	£0.25
74LS245	TTL	(QL)	£0.39	£0.35

COMPUTER SPARES

AMSTRAD

Cer. Capacitor 2200pf/4Kv	£1.85
Printer Armature (PCW 9512)	£4.20
User Manual (CPC464)	£10.95
Serv. Manual (PCW9512)	£14.99
Keyboard (CPC464)	£29.99

PHILIPS

Serv. Manual BM7513	£3.49
Serv. Manual CM8833	£7.82
Serv. Suppl. CM88xx	£3.00
Serv. Manual CM11342	£8.51
Power Switch CM9073	£8.63

COMMODORE

IC 6569 VIC (Sp. Offer)	£17.49
IC 8372B (A300C)	£44.19
IC 8565 VIC	£23.96
IC 906114-01 PLA	£8.99
Modulator 251916-02	£18.76
Serv. Manual (C64/C64C)	£14.99
User Manual (C64)	£4.99
XTAL 17.73447MHz	£4.99

Most Amstrad, CBM, Philips parts available – plus selected Acorn, Atari, Sinclair & others.

MONITOR LEAD – Amiga to Scart I/P £8.29

TRANSISTORS

2SA1706	£1.85	2SK301	£1.85
2SA2331	£1.59	BUV48A	£4.99

TV/MONITOR LINE OUTPUT TRANSFORMERS

AMSTRAD, IBM, DIGITAL, etc.	P.O.A.
COMMODORE 1084-P/SP etc.	P.O.A.
PHILIPS CM8533/CM8833 etc.	£24.94
PHILIPS CM11342/62 (CM8833 MK II)	£28.51
Ferguson TX90 14" 90°	£23.99
Ferguson TX100 20" 90°	£22.25
Ferguson TX100 22"/26" 110°	£20.91
Ferguson TX100 51cm FST	£23.95
GEC C2089H/90H/C2288 to 2291H/C2294H	£23.99
Hitachi CPT1463/CPT1623/24/25/44/46	£22.99
Hitachi CPT2036/46/76/78/CPT2234/36/CPT2246/78	£23.99
Matsui 1480A/1481/1481B	£22.25
Saisho CT141X etc. (Supply No. on L.O.T.)	P.O.A.

Many other Line O/P Transformers available.

AUDIO SPARES

AMSTRAD MX200/CDX400 (FUNAI) CASSETTE DOOR	£3.64
B. T. FREEWAY TELEPHONE – REPLACEMENT AERIAL	£3.65
PHILIPS CST427 SERVICE MANUAL	£4.50
PHILIPS D8458 SERVICE MANUAL	£3.49
SHARP RGF278, 281, 284 MAIN BELT	£1.40
TOSHIBA STU2/L MAINS TRANSFORMER	£9.99

TV SPARES

AMSTRAD TVR2 SERVICE MANUAL	£17.39
GEC/HITACHI FRAME MODULE HM6251	£9.29
PHILIPS 96009 Deg. POSISTOR (White)	£1.34
GOLDSTAR CIS4361/4441/CIT2162X/2172X 0/0 SWITCH	£6.49
SAMSUNG CI537V/CX558WT On/Off SWITCH	£6.05

Many other Switches, Manuals, Posistors, etc. from stock.

VIDEO SPARES

SHARP VC381/385/VC9300 CAPSTAN MOTOR £34.99

Large range of Video Heads, Idlers, Belt Kits, Pinch Rollers from stock – plus much, much more. Please contact us.

We also stock REMOTE CONTROLS + Many General Components.

We are pleased to serve both the Trade and End User.

DO NOT ADD VAT TO THE PRICES SHOWN – BUT PLEASE ADD £1.25 P&P

All items subject to availability – Prices can change without notice.

ORDER BY POST OR PHONE

We accept payment by VISA, Access, DELTA, SWITCH, Cheque or P.O.

MAIL ORDER ONLY to:
MARAPET (TVB)
1 HORNBEAM MEWS
GLOUCESTER GL2 0UE

COLOUR TELEVISION TUBES

SPECIAL OFFER

A51-EAL A51-JAR A51-JRU A51-JVJ
A51-JPE A51-EAM A51-EAK A51-EBD

OUTSTANDING VALUE AT

£52.50

PLUS CARRIAGE & VAT

SUPER QUALITY AND PERFORMANCE

12 months guarantee

OVER 150 VIDEO HEAD TYPES MANUFACTURED BY VISTA TO COVER MORE THAN 2000 VCR'S
FIRST CLASS QUALITY

LARGE STOCK OF TV AND VCR SERVICE COMPONENTS AND ACCESSORIES AVAILABLE FROM OUR TRADE COUNTER

vista electronics

FOR CUSTOMER CARE AND SERVICE CALL

TUBES: 0429 837100
COMPONENTS: 0429 838057
FAX: 0429 837101

VISA Access

Vista Electronics Ltd
Unit 1B, Wingate Grange Industrial Estate, Wingate, Co.Durham, TS28 5AH

2 MILLION PEOPLE USE M.C.E.S. PRODUCTS DAILY.

REMANUFACTURED:-

T.V. TUNERS, RF MODULATORS/BOOSTERS, GRUNDIG TUNER/I.F., ITT TUNER I.F. SAT TUNERS, L.N.B.s, VIDEO HEADS.

FREE PRICE LIST AVAILABLE.

RING 061-746 8037
FAX 061-746 8136

SONY TUBES RE PROCESSED WITH ORIGINAL SONY GUNS

HIGH TEMPERATURE RE-PROCESSING of Sony, Mullard 45AX, 30AX, In-line, PIL, Mini (22.5) Neck and FST Tubes.

3701B22 ..... £25.00	A51-231X ITT £46.00	A51EBD00X £58.00
3702B22 ..... £48.00	A51-570X Mullard £46.00	A51EBV10X01 ..... £58.00
370KRB22 ..... £48.00	A51-580X Mullard £46.00	A51JAR00X £64.00
370LHB22 ..... £48.00	A51-590X Mullard £46.00	A51JKQ00X Sony £74.00
400EFB22 Sony £64.00	A56-540X Mullard £52.00	A51JUH10X Sony £74.00
510YUB22 (brand new) £46.00	A56-701X ITT £48.00	A53JBW00X Sony £64.00
520SB22 Sony £64.00	A66-540X Mullard £56.00	A59EAF00X £64.00
560EGB22 Hitachi £48.00	A67-701X ITT £56.00	A59EAK00X Philips £64.00
560DYB22 ..... £48.00	A34EAC00X £48.00	A64JKJ10X Sony £95.00
570HB22 Sony £64.00	A34JBU10X Sony £64.00	A66EAF00X £74.00
680DB22 Sony £85.00	A44JFZ10X Sony £78.00	A66EAK00X Philips £74.00
680EB22 Sony £85.00	A49JHT00X Sony £64.00	A68JMT10X Sony £95.00
	A49JLV10X Sony £74.00	A68JYK10X Sony £95.00
	A51EAF00X £58.00	AXM37-001 ..... £48.00
	A51EAK00X £58.00	AXT51-001 ..... £46.00
	A51EAL00X £58.00	

For tube types not listed please enquire. All Tubes Guaranteed 12 Months

All prices quoted are excluding VAT. Exchange CRT is required.

Callers welcome. Please phone first. Delivery Available.

NEW TUBES IN STOCK – PLEASE PHONE FOR YOUR REQUIREMENTS

Very competitive, nationwide delivery and collection service

D.I.Y. Television Tube Polishing Kit

Contains everything you need to Polish scratches and small chips on your CRT screens. All you require is an electric drill. Written instructions are provided. Guaranteed to work. Worldwide Delivery **Total Price £63.00 includes P&P and VAT** Available from Luton only

Your local stockists are:

WEST ONE
Distributors Ltd
Chesham, Bucks
Tel. 0494 778197

WELL VIEW
113-133 Midland Road
Luton, Beds, U.K. LU2 0BL
Tel. 0582 402499

WELL VIEW
Southampton, Hants
Tel. 0703 449783

W.M.T.V.

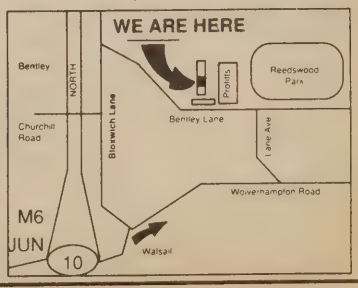
THE LARGEST INDEPENDENT WHOLESALERS IN WALSALL – SUPPLIERS OF HIGH QUALITY EX-RENTAL TVs AND VIDEOS TO THE TRADE AT COMPETITIVE PRICES

ALSO AVAILABLE: NEW B-GRADE PRODUCTS – TVs, VIDEOS, AUDIO & MICROWAVES – ALL TESTED & BOXED

½ Mile of Junction 10 M6. *Easy Parking Facilities*

UNIT 3, BENTLEY LANE BUSINESS PARK
BENTLEY LANE, WALSALL WS2 8TL
Tel: 0922 724542. Fax: 0922 722208
Mobile: 0860 499495 (24 Hours)

OPEN:
MON-FRI, 9-6pm
SAT 9-2pm
SUNDAY BY APPOINTMENT
DELIVERY SERVICE THROUGHOUT THE COUNTRY

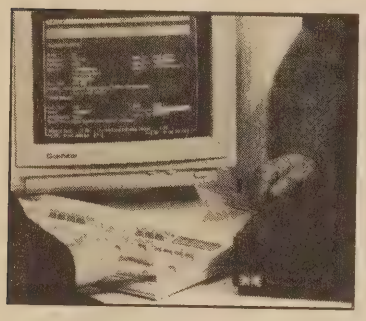


ServiceBase

The Complete TV/Video Service Manager

PC CONTROL SYSTEMS

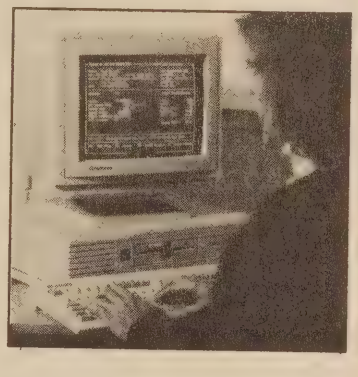
If your business is servicing TV/Video or electronic equipment then you need to keep accurate records detailing:



- Customer Name & Address
- Date The Job Was Booked In
- Unit Type, Make & Model
- Fault Description
- Billing Details & Method of Payment
- Parts Orders
- Engineers Notes
- Workshop Repair or Site Visit
- Contact Instructions
- Appointment Details

ServiceBase will breeze through these routine functions in seconds printing job cards for the engineer and invoices for your customer.

ServiceBase is packed with features other programs can only *"dream"* about...



- Report Generator
- Graphical Analysis
- Full Stock Control
- Contacts Database
- Electronic Mailing
- Wants Database
- Enquiry Source Analysis
- Loan Unit Look-up Tables
- Deposit/Delivery Payments
- IRIS Code Selection Tables
- Field Call Diary & Schedule
- Automatic Parts Ordering
- Word Processor/Mail Merge

Additional Modules will Include:

- Fault Database
- Warranty Module
- Rental Module
- Retail Module
- Maintenance Contracts
- Full Accounts

We Guarantee...

That no other available software will offer the TV & Video service industry the content and quality of program available in ServiceBase.

If for any reason you are dissatisfied with this product we shall refund your purchase in full.

"No Questions Asked"

ServiceBase will finally allow you to computerise your business in complete confidence.

Without doubt.....

No other computer program can supply all the features available in **ServiceBase,** Yet amazingly this powerful product is available for...

Only £399 + vat

Or Alternatively,

Lease a 386 Computer, Printer & ServiceBase for Under £10 PW

Full Details On request

Please send a free **ServiceBase** demonstration pack to:

NAME: _____

TITLE: _____

COMPANY: _____

ADDRESS: _____

_____ POST CODE _____

PC CONTROL SYSTEMS

PC CONTROL SYSTEMS LIMITED
HAMILTON HOUSE
66 PALMERSTON ROAD
NORTHAMPTON
NN1 5EX
TEL: 0604 601677
FAX 0604 601676

AMSTRAD DMP4000 Entire printer assemblies including printhead, platen, cables, stepper motors etc. Everything bar the electronics and case. Good stripper!! Clearance price just £5 **REF:** MAG5 or 2 for £8 **REF:** MAG8

VIEWDATA SYSTEMS Brandnew units made by TANDATA complete with 1200/75 built in modem, infra red remote controlled keyboard. BT approved, Prestel compatible, Centronice printer port, RGB colour and composite output (works with any TV) complete with power supply and fully cased. Price is just £20 **REF: MAG20** Also some customer returned units available at £10 each **REF: MAG10**

PPC MODEM CARDS. These are high spec plug in cards made for the Amstrad laptop computers. 2400 baud dial up unit complete with leads. Clearance price is £5 **REF: MAG5P1**

INFRA RED REMOTE CONTROLLERS Originally made for hi spec satellite equipment but perfect for all sorts of remote control projects. Our clearance price is just £2 **REF: MAG2**

TOWERS INTERNATIONAL TRANSISTOR GUIDE. A very useful book for finding equivalent transistors, leadouts, specs etc. £20 **REF: MAG20P1**

SINCLAIR C5 MOTORS We have a few left without gearboxes. These are 12v DC 3,300 rpm 6"x4", 1/4" OP shaft. £25 **REF: MAG25**

UNIVERSAL SPEED CONTROLLER KIT Designed by us for the above motor but suitable for any 12v motor up to 30A Complete with PCB etc. A heat sink may be required. £17.00 **REF: MAG17**

VIDEO SENDER UNIT. Transmits both audio and video signals from either a video camera, video recorder, TV or Computer etc to any standard TV set in a 100' range! (tune TV to a spare channel) 12v DC op. Price is £15 **REF: MAG15** 12v psu is £5 extra **REF: MAG5P2**

***FM CORDLESS MICROPHONE** Small hand held unit with a 500' range! 2 transmit power levels. Reqs PP3 9v battery. Tuneable to any FM receiver. Price is £15 **REF: MAG15P1**

LOW COST WALKIE TALKIES Pair of battery operated units with a range of about 200'. Ideal for garden use or as an educational toy. Price is £8 a pair **REF: MAG 8P1** 2 x PP3 req'd

***MINATURE RADIO TRANSCEIVERS** A pair of walkie talkies with a range of up to 2 kilometres in open country. Units measure 22x52x155mm. Complete with cases and earpieces. 2xPP3 req'd. £30.00 pair **REF: MAG30 .**

COMPOSITE VIDEO KIT. Converts composite video into separate H sync, V sync, and video. 12v DC operation. £8.00 REF: **MAG8P2.**

LQ3600 PRINTER ASSEMBLIES Made by Amstrad they are entire mechanical printer assemblies including printhead, stepper motors etc etc In fact everything bar the case and electronics, a good stripper! £5 **REF: MAG5P3** or 2 for £8 **REF: MAG8P3**

PHILIPS LASER 2MW helium neon tube. Brand new full spec £40 REF: MAG40. Mains power supply kit £20 **REF: MAG20P2.** Fully built and tested unit £75 **REF: MAG 75.**

SPEAKER WIRE Brown two core, 100 foot hank £2 REF MAG2P1

LED PACK of 100 standard red 5mm leds £5 REF: MAG5P4

JUG KETTLE ELEMENTS good general purpose heating element (about 2kw) ideal for allsorts of heating projects etc. 2 for £3 REF MAG3

UNIVERSAL PC POWER SUPPLY complete with flyleads, switch, fan etc. Two types available 150w at £15 REF:MAG15P2 (23x23x23mm) and 200w at £20 REF: MAG20P3 (23x23x23mm)

OZONE FRIENDLY LATEX 250ml bottle of liquid rubber, sets in 2 hours. Ideal for mounting PCB's, fixing wires etc £2 each REF: MAG2P2

***FM TRANSMITTER** housed in a standard working 13A adapter!! the bug runs directly off the mains so lasts forever! why pay £700? or price is £26 REF: MAG26 Transmits to any FM radio.

***FM BUG KIT** New design with PCB embedded coil for extra stability. Transmits to any FM radio. 9v battery req'd. £5 REF MAG5P5

***FM BUG BUILT AND TESTED** superior design to kit, as supplied to detective agencies etc. 9v battery req'd. £14 REF: MAG14

TALKING COINBOX STRIPPER originally made to retail at £79 each, these units are designed to convert and ordinary phone into a payphone. The units we have generally have the locks missing and sometimes broken hinges. However they can be adapted for their original pupose or used for something else?? Price is just £3 REF: **MAG3P1**

100 WATT MOSFET PAIR Same spec as 2SK343 and 2SJ413 (8A, 140v, 100w) 1 N channel and 1 P channel, £3 a pair **REF: MAG3P2**

VELCRO 1 metre length of each side 20mm wide (quick way of fixing for temporary jobs etc) £2 **REF: MAG2P3**

MAGNETIC AGITATORS Cosisting of a cased mains motor with lead. The motor has two magnets fixed to a rotor that spin round inside. There are also 2 plastic covered magnets supplied. Made for remotely stirring liquids! you may have a use? £3 each **REF: MAG3P3** 2 for £5 **REF: MAG5P6**

TOP QUALITY SPEAKERS Made for HI FI televisions these are 10 watt 4R Jap made 4" round with large shielded magnets. Good quality general purpose speaker. £2 each **REF: MAG2P4** or 4 for £6 **REF: MAG6P2**

TWEETERS 2" diameter good quality tweeter 140R (would be good with the above speaker) 2 for £2 **REF: MAG2P5** or 4 for £3 **REF: MAG3P4**

AT KEYBOARDS Made by Apricot these quality keyboards need just a small modification to run on any AT, they work perfectly but you will have to put up with 1 or 2 foreign keycaps! Price £6 **REF: MAG5P3**

XT KEYBOARDS Mixed types, some returns, some good, some foreign etc but all good for spares! Price is £2 each **REF: MAG2P6** or 4 for £6 **REF: MAG6P4**

PC CASES Again mixed types so you take a chance next one off the pile £12 **REF: MAG12** or two identical ones for £20 **REF: MAG20P4** component pack bargain 1,000 resistors +1,000 capacitors (all same value) £2 50 a pack **REF: MAG2P7**

1994 CATALOGUE OUT NOW

BULL'S BULLETIN BOARD

MASSIVE

WAREHOUSE CLEARANCE

FANTASTIC £20.00 REDUCTION

REFURBISHED PC BASE UNITS
COMPLETE WITH KEYBOARD

FROM ONLY **£29.00**

AMSTRAD 1512 BASE UNITS

GUARANTEED

PERFECT WORKING ORDER.

A LOW COST INTRODUCTION TO THE HOME COMPUTER MARKET.

AMSTRAD 1512SD

1512 BASE UNIT, 5.25" FLOPPY DRIVE AND KEYBOARD. ALL YOU NEED IS A MONITOR AND POWER SUPPLY. WAS £49.00

NOW ONLY **£29.00**

REF: MAG29

AMSTRAD 1512DD

1512 BASE UNIT AND KEYBOARD AND TWO 5.25" 360K DRIVES . ALL YOU NEED IS A MONITOR AND POWER SUPPLY WAS £59.00

NOW ONLY **£39.00**

REF: MAG39

SOLAR POWER PANELS

3FT X 1FT 10WATT GLASS PANELS
14.5v/700mA
NOW AVAILABLE BY MAIL ORDER
£33.95

(PLUS $2.00 SPECIAL PACKAGING CHARGE)

TOP QUALITY **AMORPHOUS SILICON CELLS** HAVE ALMOST A TIMELESS LIFESPAN WITH AN INFINITE NUMBER OF POSSIBLE APPLICATIONS, SOME OF WHICH MAY BE CAR BATTERY CHARGING, FOR USE ON BOATS OR CARAVANS, OR ANYWHERE A PORTABLE 12V SUPPLY IS REQUIRED. **REF: MAG34**

ALSO 1FT X 1FT GLASS SOLAR PANELS 12v 200mA ONLY £15.00. **REF: MAG15P3**

FREE SOFTWARE!

Brand new, UNUSED top quality *Famous brand* licensed software discs. Available in 5.25" DSDD or 5.25" HD only. You buy the disk and it comes with free BRAND NEW UNUSED SOFTWARE. We are actually selling you the floppy disc for your own **"MEGA CHEAP" storage facilities**, if you happen to get software that you want/need/like as well..... you get a "MEGA BARGAIN" to!

DSDD PKT10 $2.99 REF: MAG3P7 PKT100 $16.00 REF: MAG16
HD PKT10 $3.99 REF: MAG4P3 PKT100 $26.00 REF: MAG26P1

LARGER QANTITY PRICES AVAILABLE ON APPLICATION

£££££££WE BUY SURPLUS STOCK£££££££

TURN YOUR SURPLUS STOCK INTO CASH.
IMMEDIATE SETTLEMENT. WE WILL ALSO QUOTE FOR COMPLETE FACTORY CLEARANCE.

COMING SOON

1994 CATALOGUE.

PLEASE SEND 42P , A4 SIZED SAE FOR YOUR FREE COPY.

MINIMUM GOODS ORDER £5 00 TRADE ORDERS FROM GOVERNMENT, SCHOOLS, UNIVERSITIES, & LOCAL AUTHORITIES WELCOME ALL GOODS SUPPLIED SUBJECT TO OUR CONDITIONS OF SALE AND UNLESS OTHERWISE STATED GUARANTEED FOR 30 DAYS RIGHTS RESERVED TO CHANGE PRICES & SPECIFICATIONS WITHOUT PRIOR NOTICE ORDERS SUBJECT TO STOCK QUOTATIONS WILLINGLY GIVEN FOR QUANTITIES HIGHER THAN THOSE STATED

***SOME OF OUR PRODUCTS MAY BE UNLICENSABLE IN THE UK**

BULL ELECTRICAL

250 PORTLAND ROAD HOVE SUSSEX BN3 5QT

MAIL ORDER TERMS: CASH PO OR CHEQUE WITH ORDER PLUS £3.00 POST PLUS VAT.

PLEASE ALLOW 7 - 10 DAYS FOR DELIVERY

TELEPHONE ORDERS WELCOME
TEL: 0273 203500
FAX: 0273 323077

VISA

COMMODORE MICRODRIVE SYSTEM mini storage device for C64's 4 times faster than disc drives, 10 times faster than tapes. Complete unit just £12 **REF: MAG12P1**

SCHOOL STRIPPERS We have quite a few of the above units which are 'returns' as they are quite comprehensive units they could be used for other projects etc. Let us know how many you need at just 50p a unit (minimum 10).

HEADPHONES 16P These are ex Virgin Atlantic. You can have 8 pairs for £2 **REF: MAG2P8**

PROXIMITY SENSORS These are small PCB's with what look like a source and sensor LED on one end and lots of components on the rest of the PCB. Complete with fly leads. Pack of 5 £3 **REF: MAG3P5** or 20 for £8 **REF: MAG8P4**

FIBRE OPTIC CABLE Made for Hewlett Packard so pretty good stuff! you can have any length you want (min5m) first 5m £7 **REF: MAG7** thereafter £1 a metre (ie 20m is £22) **REF: MAG1** Max length 250m.

SNOOPERS EAR? Originall made to clip over the earpiece of telephone to amplify the sound-it also works quite well on the cable running along the wall! Price is £5 **REF: MAG5P7**

DOS PACKS Microsoft version 3.3 or higher complete with all manuals or price just £5 **REF: MAG5P8** Worth it just for the very comprehensive manual! 5.25" only.

DOS PACK Microsoft version 5 Original software but no manuals hence only £3 **REF: MAG3P6** 5.25" only.

FOREIGN DOS 3.3-German,French,italian etc £2 a pack with manual. 5.25" only. **REF: MAG2P9**

MONO VGA MONITOR Made by Amstrad, refurbished £49 **REF: MAG49**

CTM644 COLOUR MONITOR. Made to work with the CPC464 home computer. Standard RGB input so will work with other machines. Refurbished £59.00 **REF: MAG59**

JUST A SMALL SELCTION of what we have- to see more get our 1994 catalogue (42p stamp) or call in Mon-Sat 9-5.30

HAND HELD TONE DIALLERS Ideal for the control of the Response 200 and 400 machines. £5 REF:MAG5P9

PIR DETECTOR Made by famous UK alarm manufacturer these are hi spec, long range internal units. 12v operation. Slight marks on case and unboxed (although brand new) £8 **REF: MAG8P5**

WINDUP SOLAR POWERED RADIO AM/FM radio complete with hand charger and solar panel! £14 REF: MAG14P1

COMMODORE 64 Customer returns but ok for spares etc £12 REF: MAG12P2 Tested and working units are £69.00 REF: MAG69

COMMODORE 64 TAPE DRIVES Customer returns at £4 REF: MAG4P9 Fully tested and working units are £12 REF: MAG12P5

COMPUTER TERMINALS complete with screen, keyboard and RS232 input/output. Ex equipment. Price is £27 REF: MAG27

MAINS CABLES These are 2 core standard black 2 metre mains cables fitted with a 13A plug on one end, cable the other. Ideal for projects, low cost manufacturing etc. Pack of 10 for £3 REF: MAG3P8 Pack of 100 £20 REF: MAG20P5

SURFACE MOUNT STRIPPER Originally made as some form of high frequency amplifier (main chip is a TSA5511T 1.3GHz synthasiser) but good stripper value, an excellent way to play with surface mount components £1.00 REF: MAG1P1.

MICROWAVE TIMER Electronic timer with relay output suitable to make enlarger timer etc £4 REF: MAG4P4

PLUG 420? showing your age? pack of 10 with leads for £2 REF: MAG2P11

MOBILE CAR PHONE £5.99 Well almost! complete in car phone excluding the box of electronics normally hidden under seat. Can be made to illuminate with 12v also has built in light sensor so display only illuminates when dark. Totally convincing! REF: MAG6P6

ALARM BEACONS Zenon strobe made to mount on an external bell box but could be used for caravans etc. 12v operation. Just connect up and it flashes regularly) £5 REF: MAG5P11

FIRE ALARM CONTROL PANEL High quality metal cased alarm panel 350x165x80mm. Comes with electronics but no information. £15 REF: MAG15P4

SUPER SIZE HEATSINK Superb quality aluminium heatsink. 368 x 183 x 61mm, 15 fins enamble high heat dissipation. No holes! £9.99 REF: MAG10P1P

REMOTE CONTROL PCB These are receiver boards for garage door opening systems. You may have another use? £4 ea REF MAG4P5

LOPTX Line output transformers believed to be for hi res colour monitors but useful for getting high voltages from low ones! £2 each REF: MAG2P12 bumper pack of 10 for £12 REF: MAG12P3.

PORTABLE RADIATION DETECTOR

£49.99

A Hand held personal Gamma and X Ray detector. This unit contains two Geiger Tubes, has a 4 digit LCD display with a Piezo speaker, giving an audio visual indication. The unit detects high energy electromagnetic quanta with an energy from 30K eV to over 1.2M eV and a measuring range of 5-9999 UR/h or 10-99990 Nr/h. Supplied complete with handbook.

REF: MAG50

AMSTRAD HANDSETS

VCR4600, 4600MkII	11.75
VCR4700	17.63
VCR5200	11.75
VCR6100 (Indexer)	25.85
VCR6100 (Barcode Indexer)	29.38
VCR6200 Barcode	32.44
VCR9000 (Old type)	11.75
TVR 2	8.46
TVR 3	14.10
SDR400 (Equivalent)	11.05
SRD500	11.75
SRD510/520	13.81
TS90/99 Tower System	11.75
GOODMANS VCR102	11.75
PROLINE 5100TX	17.63

AMSTRAD LOPTS

CTV1000 FB182K	11.75
CTV1400 FB165KA	11.75
CTV2000 FB171	9.40
CTV2000 FB171K	9.40
CTV2200 3722002	14.10
CTV2210 3722002	14.10
TVR 3 181297	13.51
CTM644 MkII 3714009	14.10
PC12-HRCD/D MSH1FCT31	14.10
PCW9512,8256,8512	7.05

FERGUSON LOPT

MM06 00D4242001	4.70

AMSTRAD TUNERS

UE33-B01 VCR4600/4700	9.40
UE2-B31F CTV2200/2210	5.88
1810829 VCR5200	7.05
ENV87358F2 VCR7000	7.05
ENV87509F2 CTV1400	5.88

AMSTRAD IF UNITS

TPS7-B0006 VCR4600/4700	9.40
TPS7-L0002	14.10
1813766	14.10

AMSTRAD MODULATORS

18196221 VCR5200	7.05
ENP-E730-2 VCR7000	5.88
VCR4600MkII,4700	5.88
SRD100/200/400	5.88

AMSTRAD VCR MECHANISMS

4500,9000 (Old model)

CASSETTE HOUSING ASSY.	15.28
CYLINDER ASSY. (incl. Video heads)	25.26
CYLINDER LOWER DRUM ASSY. (Excl)	9.99

4600, 4700, TVR1,2,3

COMPLETE MECHANISM ASSY *(Excluding Video Heads)	35.25
*COMPLETE MECHANISM ASSY. (Excluding cylinder assy.)	29.38
MECHANISM DECK (Excl Cass. housing & Cylinder assy.)	18.80
CYLINDER ASSY. (incl. Video heads)	25.26
CYLINDER ASSY. (excluding Video heads)	20.56
CYLINDER LOWER DRUM ASSY. (Excluding Motor)	9.99
HEAD BASE ASSY. (Audio)	5.88

VMC100 – Various parts available, please phone for prices.

AMSTRAD MOTORS

Loading Motor MCB9B02	3.53
Drum Motor E20EL05	10.58
Capstan Motor LLN4B21	9.99
Capstan Motor JLN4B02	9.99
Tape Loading MCF9B02	9.99

AMSTRAD PCB's

(Complete, fully populated)

4500 Timer	11.75
4500 Systems Control	9.40
4600 Systems Control/Servo, Display & Control PCB's	29.38
4600 Display	11.75
4600 Control	5.88
4600 Video & Audio	17.63
4600 Power Supply	14.63
4600MkII Main PCB Assy.	40.82
4600MkII Timer	14.10
4600MkII Control	5.88
4600MkII Head Amp	5.88
4600MkII Power Supply	4.70
4700 Main PCB Assy.	40.82
4700 Timer	14.10
4700 Control	5.88
4700 Head Amp Assy.	5.88
4700 Power Supply	4.70
5200 Timer & Channel Disp.	17.63
5200 Video	14.10
5200 Switch Panel	4.70
6000 Power Supply	7.05
6100 Mains PCB	29.38
6100 Audio PCB	7.05
6100 Power Supply	7.05
6100 Hybrid, Chrominance	9.40
6100 Hybrid, Luminance	9.40
7000 Switch PCB no:7	2.35
CTV1400 Switches, Presets & Tuner (ENV87358F2)	8.23
CTV1400 Switches, Presets & Tuner (ENV87509F2)	8.23
CTV2200 PCB no:3	3.53
CTV2200 PCB no:4	4.70
TVR 2 Main TV PCB	37.60
TVR 3 Main TV PCB	43.48
TVR 3 TV Power Supply	15.22
TVR 3 Head Amp Assy.	5.88
TVR 3 Video Power Supply	4.70

10.95-11.7GHz LNB

2.3dB NF. 'N' CONNECTOR	17.63

AMSTRAD SERVICE MANUALS

VCR4600	9.00
VCR4600MkII,4700	9.00
VCR6000/6100	11.50
VCR7000	9.00
VCR8700	8.00
VCR8800	6.00
VCR9000/9004	9.00
VMC100	16.50
SRX100/200	4.70

AMSTRAD COMPUTER OPERATORS MANUAL

PC1640	11.75
PC2286/2386	11.75

AMSTRAD PC12MD VGA MONO MONITOR

Suitable for use with 2000/3000 series and any other VGA compatible PC 64.63

AMSTRAD SOFTWARE

ACCOUNTSMASTER (Full accounts program for running small business on any PC)	17.63
INFOMASTER (Easy to use Database, runs on PC)	17.63
LINKMASTER	11.75

Many AMSTRAD COMPUTER & PRINTER SPARES available, please phone for price.

Harrison Electronics

CENTURY WAY, MARCH, CAMBS PE15 8QW.
FAX: (0354) 51416. TEL: (0354) 51289

PRICES INCLUDE VAT.
ALL ITEMS ARE BRAND NEW AND GUARANTEED
★★ SAME DAY DESPATCH ★★
Write or Phone for FULL catalogue.
****POST & PACKING****
****EXTRA****

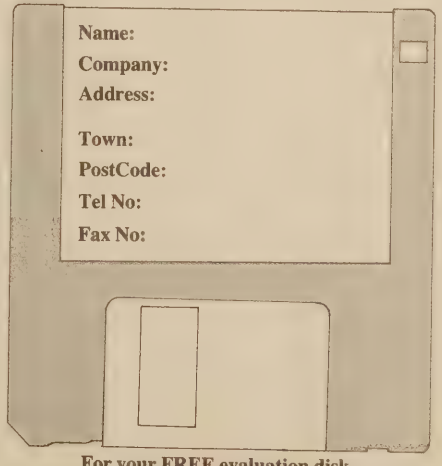
WORKSHOP MANAGER PLUS

For all your Job Tracking, Invoicing & Reporting needs at the hit of a button

User Friendly, Complete with On Disk Manual
Fully IBM compatable from Dos 2
Customer Receipts, Job Cards, Estimates & Invoices
Dealer & Insurance Reports
Full Reports on Customer & Equipment records
Full IRIS Code & Warranty ClaimBack Reports
Market FeedBack Report
Spares Database containing over 11,000 items
Parts Ordering system
History Look-up File
Data Backup & Restore Routines
F1 On-line Help Screens
Full Support & Backup
Complete package, 12 months Free Upgrades

For tomorrow's technology today call

Please rush me a disk



For your FREE evaluation disk cut out coupon and FaxBack or Post to WMGR, 5 Ladymeade, Ilminster Somerset TA19 0EA

Wessex Microtech

Telephone: (0460) 55166 Facsimile: (0460) 54808

NEW PRODUCT LAUNCH A GREAT SUCCESS

Engineers across the Country and beyond are reaping the benefits of subscribing to the new diagnosis system 'FAULT-FACT-FILES' which provides technical information that's relevant, up-to-date, inexpensive and easy to use.

Each month 'FAULT-FACT-FILES' publishes at least 150 of the latest faults on TV and VCR equipment, collated in an easy to use format that slots straight into your filing system.

You don't need to buy revised editions because 'FAULT-FACT-FILES' updates itself every month and grows with the new information to build into a comprehensive reference library.

For just £2.50 per month (or less - see right) you will receive almost 2,000 faults each year plus time saving tips and a substantial discount when you use our Help-Desk Service*

For more information and samples send a SAE (A5 size)

*Help-Desk Service costs £2.50 for subscribers to 'FAULT-FACT-FILES' and £7.50 for non-subscribers with a money back guarantee if we are unable to provide at least one possible solution for the symptoms described.

YOU COULD WIN £100 WORTH OF SPARE PARTS IN OUR PRIZE DRAW!

JUST SEND YOUR NAME, ADDRESS & POSTCODE WITH A CHEQUE/PO FOR REQUIRED AMOUNT TO:

'VISION-ON' (TV1)
16, HILLVIEW PARK
NEWTOWNABBEY
BT36 8HW

1YR - £30 (MINIMUM)
2YRS- £55 (SAVE £5.00)
3YRS- £80 (SAVE £10.00)
4YRS- £100 (SAVE £20.00)

OVERSEAS ADD £10 PER ANNUM (AIRMAIL POSTAGE)

WE ALSO ACCEPT PAYMENT BY
ACCESS/VISA
(SIMPLY SEND YOUR CARD NUMBER AND EXPIRY DATE)

AN3821K	£7.65	HA13118	£1.80	LM393N	£0.25	SAA5012	£3.25	STK5333	£4.20	TA7270	£1.60	TCA660B	£0.40	TDA2560	£4.40	TDA4905	£1.00
AN5265S	£1.65	HA13119	£1.90	M192B1	£1.80	SAA5030	£6.35	STK5372	£3.30	TA7270P	£1.85	TCA800Q	£1.60	TDA2576A	£5.90	TDA7240A	£2.30
AN543S	£1.35	HA13403	£4.60	M293	£14.50	SAA5050	£4.60	STK5421	£2.50	TA7271P	£1.65	TCA910	£1.15	TDA2577A	£4.20	TDA8140	£2.30
AN5512	£2.05	HA1377	£2.30	M490	£15.20	SAB3013	£5.75	STK5422	£6.30	TA7273	£3.10	TCA940	£3.35	TDA2578A	£2.50	TDA8153	£5.00
AN5515	£2.25	HA1388	£2.50	M491	£7.85	SAB3021	£6.85	STK5451	£5.20	TA7274	£2.60	TDA1004A	£3.35	TDA2581	£5.70	TDA8170	£2.50
AN5521	£2.05	HA1389	£2.40	MS011SAP	£3.15	SAB3035	£6.25	STK5466	£4.60	TA7280	£2.00	TDA1011	£1.25	TDA2581Q	£9.95	TDA8180	£5.30
AN5612	£2.90	HA1392	£1.50	MS1102L	£1.70	SAF1032P	£5.40	STK5471	£4.40	TA7299	£2.25	TDA1011A	£1.40	TDA2582	£1.90	TDA8190	£3.20
AN5900	£1.20	HA1397	£2.50	MS1231P	£1.85	SAF1039	£2.15	STK5476	£4.90	TA7313AP	£0.60	TDA1013A	£1.40	TDA2591	£1.05	TDA9503	£2.05
AN6310	£4.80	HA1398	£2.20	MS1393AP	£4.55	SDA2112	£10.90	STK5481	£6.05	TA7317P	£0.90	TDA1015	£0.95	TDA2593	£0.70	TEA1002	£4.90
AN6326	£3.55	HA1452	£4.80	MS1515L	£1.90	SL1430	£1.30	STK5482	£3.95	TA7325P	£0.40	TDA1020	£1.20	TDA2594	£2.15	TEA1009	£1.50
AN6341	£2.20	HM6232	£10.20	MS1521L	£0.50	SL1431	£1.60	STK6962	£2.50	TA7358P	£0.75	TDA1035SB	£4.05	TDA2595	£2.35	TEA1014	£1.80
AN6610	£0.85	HM6251	£9.40	MS218L	£0.45	SL1432	£2.00	STK7216	£5.45	TA7343	£0.70	TDA1035T	£1.80	TDA2600	£3.00	TEA1039	£2.05
AN6671K	£5.25	HM7103	£14.00	MS231L	£0.50	SL471	£1.60	STK7226	£8.05	TA7535BP	£0.85	TDA1037	£8.40	TDA2611A	£0.60	TEA2018A	£1.40
AN7158	£2.65	KA2101	£0.70	MS3216P	£1.40	SL490	£2.20	STK7308	£4.90	TA7607AP	£2.55	TDA1044	£1.35	TDA2611AQ	£1.95	TEA2164	£2.60
AN7161	£3.50	LA1201	£0.50	MS4543L	£1.55	SN29764AN	£1.90	STK7348	£4.60	TA7609	£1.85	TDA1060	£1.50	TDA2640	£4.05	TEA2165	£6.20
AN7171K	£4.30	LA1230	£1.85	MS4544L	£1.80	SN7474N	£0.35	STK7356	£5.50	TA7630	£1.80	TDA1082	£4.15	TDA2652	£14.20	TL011CP	£1.30
BA5102A	£1.40	LA1385	£1.55	MS4548L	£3.20	SN76013ND	£7.90	STK7358	£5.35	TA7640AP	£0.90	TDA1083	£1.10	TDA2653A	£3.20	TL071CP	£0.35
BA536	£1.05	LA3161	£0.35	MS4644BL	£3.20	SN76227N	£1.00	STR1096	£4.60	TA7676P	£4.15	TDA1151	£1.45	TDA2680	£5.00	TL494	£1.55
BA5406	£2.10	LA4140	£0.35	MS4648L	£6.55	SN76666N	£1.20	STR40090	£6.70	TA7680AP	£3.70	TDA1170	£1.50	TDA3190	£1.20	TMP47C432 AP	£11.00
BA6109	£1.75	LA4182	£1.65	MS4898AP	£20.30	SN76705AN	£1.60	STR4090	£16.20	TA7698AP	£5.85	TDA1170N	£1.30	TDA3190P	£1.30	TMP47C434	
BA6209	£1.25	LA4192	£1.05	MS8485P	£5.85	STA341M	£2.45	STR4211	£4.65	TA7705	£1.60	TDA1170S	£1.10	TDA3300B	£20.70	N3555	£17.60
BA6219	£1.35	LA4220	£1.20	MB3730	£2.30	STA401	£2.35	STR440	£6.20	TA7769	£1.35	TDA1190Z	£4.00	TDA3330	£10.70	UC3844	£1.70
BA6222	£1.55	LA4261	£2.20	MB3731	£2.10	STA441C	£2.70	STR441	£8.20	TA8205	£3.80	TDA1200	£0.85	TDA3541	£0.90	UPA81C	£0.90
BA656N	£0.75	LA4270	£2.65	MB3732	£2.80	STK0029	£5.80	STR451	£14.60	TA8210H	£4.65	TDA1270	£1.70	TDA3560	£3.60	UPC1181H	£6.70
BA718	£0.70	LA4422	£1.20	MB3732	£2.80	STK0039	£7.00	STR50020	£8.90	TA8215	£4.50	TDA1412	£0.75	TDA3561A	£3.25	UPC1182H	£5.85
CA1310E	£0.70	LA4440	£1.80	MC13002P	£5.65	STK0040	£7.30	STR50103	£5.80	TA8691N	£6.60	TDA1506	£4.50	TDA3562A PHIL	£3.95	UPC1185H	£10.10
CA3094	£3.00	LA4445	£1.20	MC1310P	£0.80	STK0059	£9.65	STR54041	£6.65	TBA120	£0.50	TDA1510	£2.50	TDA3562A SGS	£3.95	UPC1188	£3.30
CD4001	£0.12	LA4460	£1.40	MC1327AP	£1.20	STK025	£9.50	STR5412	£8.20	TBA120AS	£0.85	TDA1512	£3.10	TDA3562A TFK	£4.50	UPC1212C	£0.80
CD4011	£0.20	LA4461	£1.40	MC1350P	£1.75	STK3042	£6.80	STR58041	£6.25	TBA120S	£0.85	TDA1515A	£2.45	TDA3565	£2.20	UPC1228HA	£0.55
CD4013	£0.32	LA447S	£2.20	MC1352P	£1.40	STK3062	£8.80	STR6020	£10.00	TBA120T	£0.50	TDA1516Q	£3.50	TDA3566	£3.30	UPC1230	£2.10
CD4016	£0.12	LA4476	£2.20	MC1358P	£1.50	STK4131	£7.70	STR6020KIT	£11.00	TBA120U	£0.35	TDA1518Q	£3.25	TDA3571B	£3.00	UPC1230H	£2.70
CD4021	£0.40	LA4500	£2.10	MC145288BCP	£1.60	STK4141	£9.20	TA7063P	£1.05	TBA2800	£1.55	TDA1670A	£2.75	TDA3576	£11.80	UPC1278H	£2.60
CD4052	£0.27	LA4505	£1.70	MDA2062	£2.10	STK4142	£8.10	TA7122BP	£0.60	TBA395	£0.65	TDA1701	£4.75	TDA3640	£4.65	UPC1318	£2.90
CD4053	£0.18	LA4508	£2.20	ML923	£14.10	STK4162M	£9.40	TA7146P	£7.60	TBA520	£0.80	TDA1870	£3.25	TDA3650	£9.80	UPC1335V	£3.80
CD4066	£0.28	LA4520	£1.05	MN1405UKF	£10.95	STK4171	£10.40	TA7176P	£1.20	TBA540	£1.90	TDA1904	£1.10	TDA3653AQ	£1.80	UPC1351C	£1.60
CD4069	£0.15	LA4700	£3.75	MN1435UX	£14.20	STK4181	£12.75	TA7193AP	£3.25	TBA540Q	£0.75	TDA1908A	£1.10	TDA3653B	£1.80	UPC1353	£1.25
CD4070	£0.20	LA5112	£5.80	MN1435UXB	£10.50	STK4181A	£12.35	TA7193P	£7.00	TBA560C	£1.95	TDA1940	£2.70	TDA3654	£1.60	UPC1363C	£1.05
CNX62A	£2.85	LA5512	£0.55	MSM5840H	£15.20	STK4332	£5.45	TA7205AP	£1.40	TBA570A	£1.70	TDA1950	£1.80	TDA3810	£2.50	UPC1363CA	£2.15
CX109	£6.95	LA7223	£2.45	NE545B	£3.10	STK4352	£1.60	TA7207P	£1.60	TBA651	£0.95	TDA2002	£0.80	TDA4420	£1.20	UPC1365C	£1.60
ER1400	£2.05	LA7520	£2.65	NE555	£0.20	STK437	£8.20	TA7210P	£1.40	TBA750Q	£5.00	TDA2004	£1.20	TDA4427	£1.80	UPC1378H	£1.15
HA11235	£1.85	LA7800	£1.35	NE555N	£0.35	STK4392	£5.85	TA7214P	£3.65	TBA800	£0.50	TDA2005	£1.30	TDA4442	£3.40	UPC1391H	£0.50
HA11244	£3.70	LA7801	£1.25	NE646N	£2.55	STK441	£11.70	TA7217P	£1.20	TBA810P	£1.60	TDA2006	£1.00	TDA4500	£3.70	UPC1394	£1.20
HA1124A	£1.10	LA7820	£1.95	NP1106	£11.75	STK459	£11.10	TA7222	£1.15	TBA810S	£0.65	TDA2009	£2.20	TDA4501	£5.00	UPC1420CA	£6.50
HA11423	£1.90	LM1303N	£0.85	SAA1004	£1.10	STK461	£10.40	TA7222AP	£1.20	TBA820	£0.80	TDA2020	£3.65	TDA4503	£3.30	UPC1488H	£1.20
HA11440	£2.80	LM1877	£1.35	SAA1121	£11.10	STK4843	£11.00	TA7227P	£2.20	TBA820L	£0.50	TDA2030H	£0.60	TDA4505E	£4.60	UPC2002	£2.00
HA1166X	£3.30	LM317T	£0.45	SAA1174	£5.00	STK5211	£15.60	TA7230P	£1.50	TBA820M	£0.30	TDA2030V	£1.00	TDA4600F	£1.60	UPC324C	£1.65
HA11713	£1.10	LM324N	£0.30	SAA1250	£2.85	STK5322	£6.25	TA7233P	£1.85	TBA920	£0.50	TDA2170	£2.45	TDA4600/2	£2.35	UPC4558C	£0.50
HA11741	£6.70	LM339N	£0.15	SAA1251	£5.65	STK5325	£5.85	TA7240P	£2.35	TBA950	£1.65	TDA2270	£1.60	TDA46002D	£3.45	UPC574C	£1.00
HA11745	£5.00	LM358	£0.20	SAA1351	£8.15	STK5326	£6.10	TA7241	£2.20	TBA970	£4.00	TDA2530	£3.70	TDA4600	£1.60	UPC580C	£2.45
HA13001	£1.60	LM358N	£0.40	SAA3027P	£7.55	STK5331	£2.90	TA7250	£3.95	TCA2705	£1.00	TDA2540	£0.85	TDA4601	£1.50	UPD1937C	£3.10
HA13108	£3.50	LM380N	£0.75	SAA5010	£4.50	STK5332	£2.15	TA7267	£1.95	TCA440	£1.90	TDA2541	£0.70	TDA4601D	£2.35	X0065CE	£2.10
														TDA4605	£3.55	X2402	£4.55

WE GUARANTEE THAT ALL SPARES ARE BRAND NEW AND OF THE FINEST QUALITY. PLEASE SEND A4 S.A.E. FOR LATEST CATALOGUE.

Please Phone Us For Any Part Not Listed As We Are Holding Over 10,000 Items. All Orders Are Despatched Within 24 Hours.

PLEASE ADD £1.25 P+P AND THEN 17½% VAT TO TOTAL. PRICES QUOTED ARE SUBJECT TO STOCK AVAILABILITY AND MAY CHANGE WITHOUT PRIOR NOTICE. POSTAL ORDERS AND CHEQUES ACCEPTED ONLY.

REMOTE CONTROLS £9 + VAT PLEASE SUPPLY MAKE + MODEL WHEN ORDERING

ELECTRO-PARTS
WHOLESALERS
37 ARTHUR STREET, BLAKENHALL,
WOLVERHAMPTON WV2 3DY
TEL/FAX: (0902) 620813

RENTAL FINANCE

Expand your CTV and VCR rental business with no capital outlay and increase your profitability.

Broughfame has the solution and their rental finance plan will provide facilities from £2,500 upwards.

For further details ring or write to Bob Wickham at the address below:

BROUGHFAME LIMITED

39 SOUTH STREET, TARRING

WORTHING, WEST SUSSEX BN14 7LG

TEL: Worthing (0903) 821020

FAX: Worthing (0903) 821194

TELEPLACE SCOTLAND.

TV & VIDEO WHOLESALE.

Working Faulty Refurbished Stock Delivered.

8, Colquhoun Park, Hillington Industrial Estate, Glasgow G52 1XX.

TELEVISION

Subscribe to the magazine that experienced electronics professionals never miss

Whatever your interest in the world of television electronics, there's a wealth of news, advice and hard information for you in *TELEVISION*.

TELEVISION offers you a definitive guide to today's TV electronics business, keeping you up-to-date with new developments in TV, video and satellite – whilst furnishing you with 'hands-on' advice and information on the latest equipment.

- *Servicing solutions*
- *TV fault finding*
- *New Products*
- *VCR clinic*
- *Satellite TV*
- *Equipment reviews*
- *Readers' letters*
- *CD players casebook*
- *Components*
- *News and comment*
- *And much more!*

SUBSCRIBING IS SIMPLE

Complete the coupon and return it to us at TELEVISION, Reed Business Publishing, FREEPOST, 9th Floor, Quadrant House, The Quadrant, SUTTON, Surrey CM2 5BR

Please send me TELEVISION

- ☐ **One Year at a cost of £26**
- ☐ **Two Years at a cost of £49 SAVE £3**
- ☐ **Three Years at a cost of £70 SAVE £8**

Name _____

Title _____

Company _____

Address _____

_____

Postcode _____

Telephone Number _____

_____

Reed Business Publishing Company Registered in England (registered number 151537) VAT no: 235723565

4 WAYS TO PAY

1 ☐ I enclose a cheque for £_____ made payable to Reed Business Publishing Ltd

2 Please charge my:
☐ Access ☐ Visa
☐ Diners Club ☐ American Express
Expiry Date _____
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

3 Please invoice me/my company
Order No. _____

4 Or alternatively just ring our credit card hot-line on **0622 721666** and quote reference *IJ2*

Are you registered for VAT, Yes☐ No ☐
If yes, please supply your registration Number
_____

Please send a VAT receipt ☐

Signature _____ Date _____

Prices apply to UK, Isle of Man, and Channel Islands only.

IJ2

SOUTH LONDON TRADE WAREHOUSE NOW OPEN

BEST STOCK — MAJOR BRAND NAMES — BEST PRICES

WHOLESALERS

OF THORN + NON-THORN EX-RENTAL TV's & V.C.R., TESTED + UNTESTED 'B' GRADE + LIQUIDATION STOCK

AUDIO: Stocks of Audio, Midi + Mini Hi-Fi CD's Radio Cassettes, Walkmans, ALL TOP BRAND NAMES AT FRACTION OF RETAIL PRICE

STOCK ALWAYS CHANGING

TEPCO ELECTRONICS LTD

TEL 081-769 6149 Ask for Chris
071-924 1606 Ask for Tony
081-677 5749 Warehouse Line
FAX 081-769 4952

OPEN MON—SAT 9.30 TO 6pm

WILTSGROVE LTD

NEW *Definition* BRAND
PORTABLE 14' REMOTE TV
21 PIN SCART
ON SCREEN DISPLAY,
VHF/UHF TUNER,
12 MONTHS GUARANTEE etc.
* GUARANTEED LOWEST PRICE *,

WORKING GRADED STOCK — E-180 VIDEO TAPES Qty Under 8½p

ALL BOXED WITH INSTRUCTIONS

SHARP RG292 stereo car radio cassette, 2 band with anss	£17.00
SHARP RG296 stereo car radio cassette, 3 band with anss	£19.99
SHARP JC105 personal cassette player	£6.50
SHARP JC130 personal radio/cassette player	£7.50
SHARP JC200 personal cassette player with auto/rev	£9.50
SHARP JC510 personal cass/auto rev/2 band radio	£12.50

MIDI-SYSTEMS
Basic Systems from £25.00 Remote control sys. from £40.00
Systems with CD from £50.00

VIDEO — WORKING EX-RENTAL STOCK — TV

Top loader video	£35.00	Basic colour TV's	from £25.00
Front loaders with r/c	from £45.00	Remote TV's with r/c	from £35.00
Twin speed VCR with r/c	from £55.00	Teletext TV's with r/c	from 45.00
Thorn 8947 VCR with r/c	£65.00		

EX-RENTAL FERGUSON 3C01 CAMCORDER

Back-space edit facility, records on standard VHS, recording time: 240 minutes, date insert facility, automatic Iris control, 6:1 motorized zoom lens, tape play back facility. Only £199

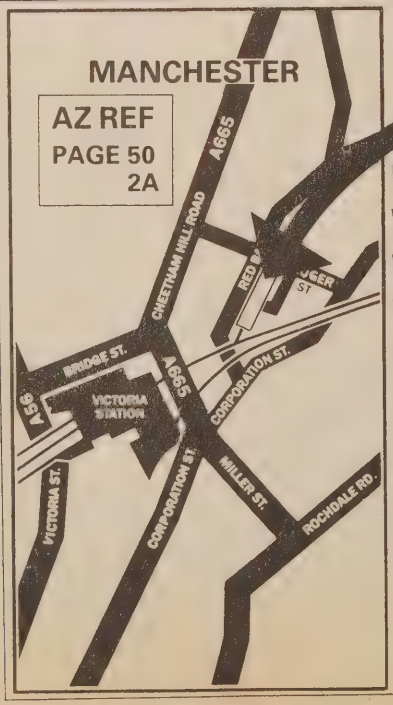
28-29 RIVER STREET, DIGBETH
BIRMINGHAM B5 5SA
TEL: 021 772-2733 FAX: 021 766-6100

EXPORT ENQUIRIES WELCOME
ALL STOCK SUBJECT TO AVAILABILITY, VAT & CARRIAGE

MANCHESTER'S NO 1 WHOLESALER

RED BANK UNIT 20

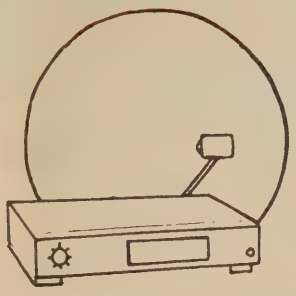
HERE



OVER A 1000 SETS IN STOCK
BASIC TELEVISIONS FROM..... £5
WORKING TELETEXT FROM £35
WORKING PANASONIC TEXT £40
WORKING GEC/HITACHI TEXT £40
FRONT LOADING VIDEOS FROM..... £20
REFURBISHED STOCK AVAILABLE
OPENING HOURS FROM
10AM TILL 5PM MONDAY TO FRIDAY
UNIT 20, RED BANK ARCHES, RED BANK
MANCHESTER M4 4HF
— CHEQUE — ACCESS — VISA —

PHONE 061 832 4220
FAX 061 834 6368
PRICES SUBJECT TO VAT

BRITAINS LARGEST INDEPENDENT PRESENTS THE LARGEST STOCK OF 'B' GRADE



HC TV LTD
TV & VIDEO WHOLESALERS

HCTV WISHES ALL IT'S CUSTOMERS A HAPPY NEW YEAR

NEW GRADED STOCK

MANUFACTURER TESTED, BOXED AND SEALED AS NEW

14″ STD	20″ R/C	25″ R/C
14″ R/C	20″ FASTEXT	25″ FASTEXT
16″ STD	21″ R/C	25″ NICAM
16″ R/C	20″ FASTEXT	28″ FASTEXT
20″ STD	21″ NICAM	28″ NICAM

PLUS A RANGE OF LONG PLAY AND NICAM VIDEO'S

DON'T MISS OUT! PAY US A VISIT

PRESTON
139 Oakshott Place
Walton Summit
Ind Est
Preston (M6 Junc 29)
Tel: 0772 312101

BIRMINGHAM
208 Bromford Lane
Erdington
Birmingham B24 8DL
Tel: 021-327 3273 Fax: 021-322 2011

LONDON
Unit 2
The Royal London Est
29/35 North Acton Road
London NW10
Tel: 081-961 5005

FAX: 0274 722229

BESCO LIMITED T/A NORTH WEST ELECTRONICS

ENTIRE RANGE OF EX-RENTAL TVs & VIDEOS

NEW STOCKS EVERY DAY, WORKING OR OFF THE PILE

makes include: Sharp, Hitachi, Ferguson, Pye, NAT PAN, ITT etc.

Late models always available.

KNOCKOUT PRICES ON COLOUR TVs

FERGUSION, PYE, HITACHI, PHILIPS, BUSH, ITT, etc.

TELETEXT BARGAINS FROM **£30.00** (WORKING).

FERGUSON TX TELETEXT ONLY **£45**. PHILIPS/PYE TEXT ALWAYS AVAILABLE

OVER 1000 COLOUR TV AND VIDEOS AVAILABLE

RING OUR HOTLINES NOW FOR PRICES OR CALL IN, YOU WILL BE DELIGHTED

Working Ex-Equipment Panels

IF	Converger	Decoder	Line scan	Power	Frame
T20//22X	5	14	18	17	14
T26 X	5	16	20	17	X
Philips G11 14.50	5	12	20	20	11.50

All prices include Postage & Packing. But + VAT

★ *IF THE PANEL YOU REQUIRE IS NOT LISTED PLEASE ASK* ★

Visa Welcome

Prices are plus VAT and based on quantity

Cheques accepted

Walker House, 16 Bottomley Street, Bradford BD5 7LJ

Ring Tony 0274 308186 – Open 6 days – 9am-5pm

WESTERN TRADE SERVICES

EST 14 YEARS

SUPPLIERS OF EX-RENTAL

TV & VIDEO

THORN AND NON THORN

SOUTH WEST

2A Barton Hill Road, Torquay, Devon TQ2 8JH

Tel: 0803 312222

Fax: 0803 326767

Delivering throughout Devon and Cornwall weekly

WALES

Unit 6, Islwyn Workshop, Portymaester Ind Est, Risca, Gwent

Tel: 0633 612667

TV INTERNATIONAL

FOR

'B' GRADE

AUDIO – VIDEO

– MICROWAVES

LARGE STOCKS, NEW – BOXED – COMPLETE.

SOLD FULLY TESTED OR DIRECT – UNTESTED

ALL MINT

TEL. 0384 482 575

ASK FOR TRADE DEPT

FAX. 0384 265 236

PEARTREE LANE, DUDLEY, WEST MIDLANDS

OPEN 9.00 – 6.00

MONDAY – SATURDAY

COLOURTRADE

ESTABLISHED 1973 – WHOLESALE ONLY

NEW 'B' GRADE

Major Brands ONLY Satellite, Receivers, Decoders, Microwaves TV – Video – AUDIO

COMPLETE BOXED – WITH STAND – HANDSET – BOOK ETC

MINT LATEST NICAM FASTEXT F.S.T.

Phone 021-359 7020

FAX 021-359 6344

221-222 BRIDGE ST WEST, HOCKLEY,

BIRMINGHAM B19 2HU

CentreVision

SLOPER ROAD · LECKWITH · CARDIFF

EST · 1964

START THE NEW YEAR WITH A VISIT TO CENTREVISION

WORKING TV'S NON FST

TEXT – £45.00

REMOTE – £35.00

BASIC – £30.00

100'S OF TV'S + VIDEO'S IN STOCK

50 TV'S ON DISPLAY FOR DIRECT RE-SALE

Access **0222 344754** VISA

DO YOU REPAIR WHITE GOODS?

THEN YOU SHOULD KNOW ABOUT

DATAPART

THEY HAVE THE LARGEST AVAILABLE RANGE OF GENUINE AND PATTERN PARTS FOR MOST BRANDS OF :-

WASHING MACHINES
DISHWASHERS
REFRIGERATORS
COOKERS
VACUUM CLEANERS
KETTLES
IRONS
TOASTERS
MICRO-WAVE OVENS

★NEW★ 535 page pattern parts catalogue now available at a cost of £6 to non-account customers

DATAPART LTD

Access

ELECTRON HOUSE,
100 GREAT BARR STREET
BIRMINGHAM B9 4BB

VISA

SALES DESK 021 766 5551 24
FAX FREE 0800 373 459 HOURS

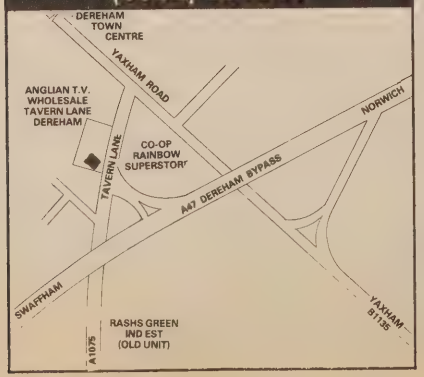
ANGLIAN TV WHOLESALE

EX-RENTAL TVs & VCRs

THORN AND GRANADA STOCK

NEW 'B' GRADE
T.V., VIDEO
AUDIO, MICROWAVE

BEST POSSIBLE PRICES
EXPORT ENQUIRIES WELCOME
& DELIVERY AVAILABLE
RING FOR DETAILS
ANGLIAN TV WHOLESALE,
NOW AT
UNIT 4, BRECKLANDS BUSINESS CENTRE
TAVERN LANE,
EAST DEREHAM,
NORFOLK
(0362) 691611



AERIALS

FOR TV & FM RADIO, PLUS 1000's OF MASTS, BRACKETS, LASHING KITS, CLAMPS, PLUGS, CABLES, OUTLETS, DIPLEXERS ETC.

AMPLIFIERS

FOR DISTRIBUTION SYSTEMS AND DOMESTIC, MAST HEAD OR SET BACK. WE HAVE ONE OF THE LARGEST RANGES, AVAILABLE FROM STOCK

MAIN DISTRIBUTORS

FOR ANTIFERENCE, LABGEAR, WOLSEY FRINGE, TRIAX, TELEVES, VOLEX-RAYDEX, KUBLER + MANY MORE

COASTAL AERIAL SUPPLIES

UNIT X2 Rudford Industrial Estate
Ford, Arundel
0903 723726
NO MINIMUM ORDER VALUE
NEXT DAY DELIVERY ACROSS UK
CARRIAGE FREE ON ORDERS £250+

TRADE TVs EX RENTAL TV & V.C.R.s

BASICS FROM	£7.00
REMOTES FROM	£15.00
TEXT FROM	£25.00
VCRs FROM	£25.00

TELEPHONE
ROY SMITH
0302 – 349583
10AM – 5PM MON-FRI
A.R. INTERNATIONAL BUILDING
UNION ST,
DONCASTER, DN1 3AE
OFF ST SEPULCHRE GATE WEST

New WHOLESALE TV and VIDEO Warehouse

Vision World (Cardiff) has just opened for business in the Cardiff Bay area. Many makes kept in stock including Thorn and Granada. If you're the type of business that likes competitive prices and a good service, then contact:

VISION WORLD (Cardiff)
Unit 89
Portmanmoor Road
Industrial Estate
East Moors
Cardiff CF2 2HB
Tel: 0222 458989

CAMPION WHOLESALE LTD.

QUALITY USED T.V. & VIDEO
COMPLETE RANGE OF T.V.'s AND VIDEOS MOST MAKES AND MODELS AVAILABLE

STOCK ARRIVING DAILY
T.V.'s from £3.00
Videos from £30.00
Prices Ex-VAT

Free Delivery Service to most areas of the U.K.

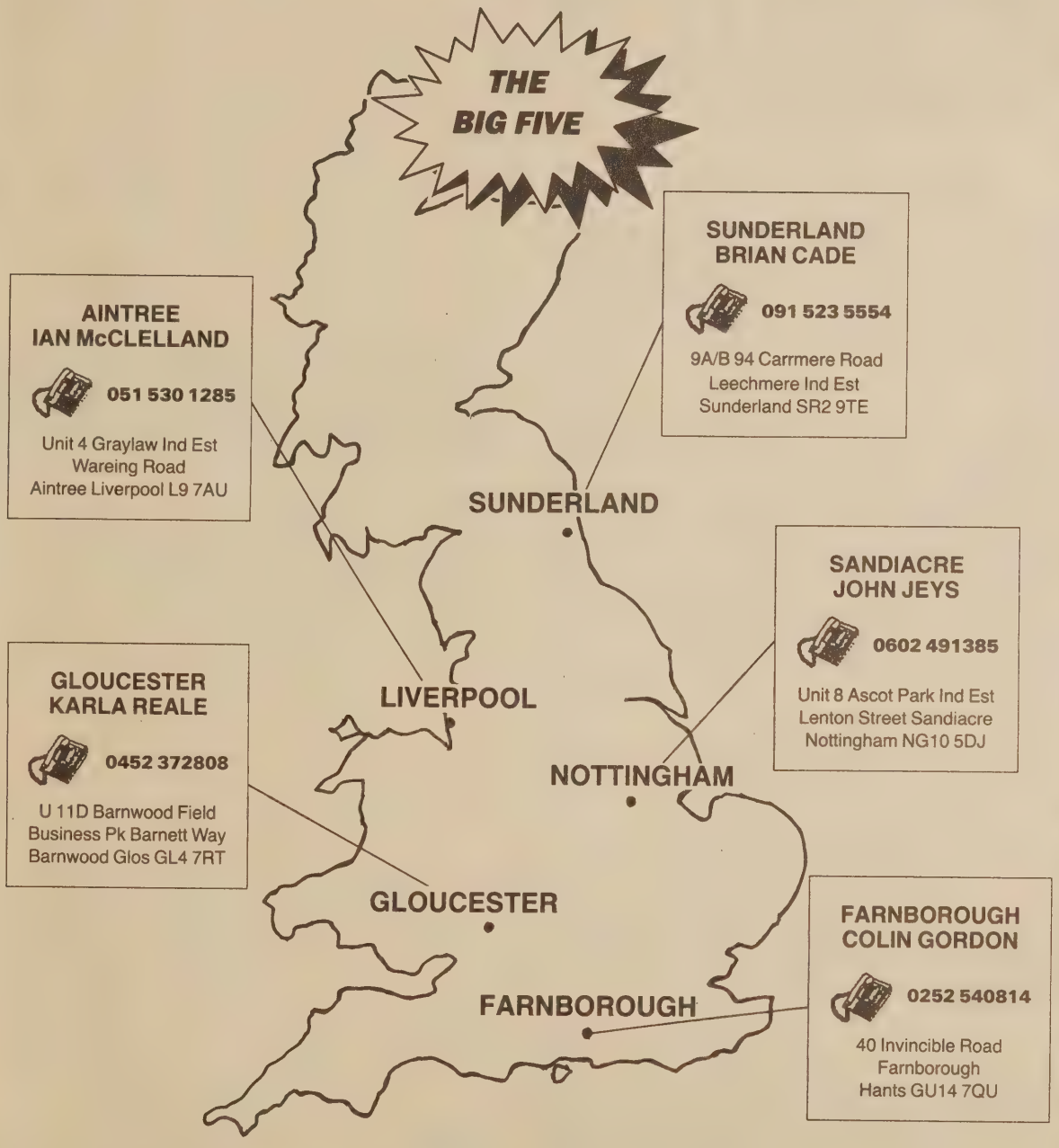
UNIT 75, BARRACKS ROAD,
SANDY LANE INDUSTRIAL ESTATE,
STOURPORT-ON-SEVERN,
WORCESTERSHIRE DY13 9QB
Just 10 Mins from
M5 Junct. 6 Worcs North

For your export requirements contact us.

0299-879642 or 879643
FAX: 0299 827984

TELEPRICE LIMITED

LEADERS IN THE SUPPLY OF EX-RENTAL TV, VIDEO & AUDIO



AINTREE
IAN McCLELLAND
051 530 1285
Unit 4 Graylaw Ind Est
Wareing Road
Aintree Liverpool L9 7AU

SUNDERLAND
BRIAN CADE
091 523 5554
9A/B 94 Carrmere Road
Leechmere Ind Est
Sunderland SR2 9TE

SANDIACRE
JOHN JEYS
0602 491385
Unit 8 Ascot Park Ind Est
Lenton Street Sandiacre
Nottingham NG10 5DJ

GLOUCESTER
KARLA REALE
0452 372808
U 11D Barnwood Field
Business Pk Barnett Way
Barnwood Glos GL4 7RT

FARNBOROUGH
COLIN GORDON
0252 540814
40 Invincible Road
Farnborough
Hants GU14 7QU

CALL US FOR LATEST PRICES

CENTRAL TV

EX-RENTAL

● SUPERB RANGE OF TV'S & VCR'S
● THORN & GRANADA

● DIRECT LOADS AVAILABLE FROM SOURCE

EXPORT ENQUIRIES WELCOME

'B' GRADE

SWITCH ON TO TOP QUALITY BRANDS OF

PHONE TODAY FOR BEST RESULTS

ALL SIZES OF SCREEN TV AVAILABLE, BOTH IN FAST TEXT & DIGITAL NICAM STEREO

VIDEOS: CURRENT MODEL

Single, Twin Speed, Nicam S-VHS

CAMCORDER

C FORMAT, FULL SIZE, 8mm

MICROWAVES ● PORTABLE ● HIFI ●
SATELLITE ● VIDEOCRYPT ●

PORTABLE £100

FULL REMOTE, BOXED

CTV LONDON
Eley Estate, Nobel Road
Edmonton N18
TEL: 081-807 4090
FAX: 081-884 1314

CENTRAL TV WHOLESALE DISTRIBUTION LTD
369 Stratford Road, Sparkhill
Birmingham B11
TEL: 021-772 1591
FAX: 021-766 6383

Access VISA

C.T.V.

UNIT 5, THE PHOENIX BUILDING, RUSHOCK TRADING ESTATE, DROITWICH ROAD, NEAR KIDDERMINSTER
TELEPHONE: 0299-251522
0836-585829/0860-809673 (24HR)

SUPPLIERS OF HIGH QUALITY
EX-RENTAL TELEVISIONS AND VIDEOS
LARGE STOCKS ALWAYS AVAILABLE
ALL AT COMPETITIVE PRICES
Also available: 'B' Grade Products, Audio, Microwaves and Complete Range of Televisions and Videos
OPEN: MON-FRI – 9.30-5.30

TEL: 0299-251522
0836-585829/0860-809673 (24HR)

Fax: 0299-251543 EXPORT ENQUIRIES WELCOME

WOODHAM TV LTD

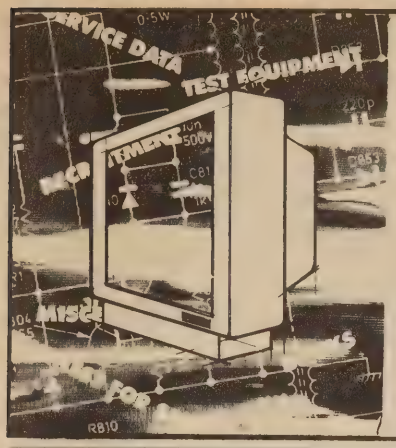
Wish all their customers a
Happy & Prosperous New Year

Wholesalers of
Thorn & Granada
ex-rental TVs and Videos
*Working – Non-working
*Many Special Offers
Open Mon-Sat 9.30-5.30

PHONE NOW

0245-32583

UNIT 8, CUTLERS RD,
SOUTH WOODHAM FERRERS,
CHELMSFORD, ESSEX



TELEVISION CLASSIFIED

No other consumer magazine in the country can reach so effectively those readers who are wholly engaged in the television and affiliated electronic industries. They have a need to know of your products and services.

The prepaid rate for semi display setting is £12.00 per single column centimetre (minimum 3 cm). Classified advertisements £8.40 per line, box number £22.00 extra. All prices plus 17½% VAT. All cheques, postal orders etc., to be made payable to Reed Business Publishing. Advertisements, together with remittance, should be sent to The Television Classified, 11th Floor, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Access

PHONE 081-652 8339 FAX 081-652 8931

BARCLAYCARD VISA

SERVICE DATA

INFOTECH

VISA

76 Church Street, Larkhall, Lanarkshire ML9 1HE
Tel: (0698) 883334 – (0698) 888343
Fax: (0698) 884825
Send a large SAE for your FREE catalogue of our other publications

HOW WOULD YOU LIKE TO GET ANY SERVICE MANUAL YOU WANTED FOR ONLY £8.50?
WELL, NOW YOU CAN!

We are running a very special offer of any 20 manuals for only £170. No catches! Order as you need them (no time limit) including all those expensive manuals you couldn't previously afford. No hidden expenses like post & packing (that's included in the price).

And if that isn't enough!
We are giving away our Data Reference Manual FREE with every subscription to this 20 manuals for £170 offer!

EUROPEAN SCRAMBLING SYSTEMS NEW 3rd Edition

European Scrambling Systems is the "bible" of the black arts of signal security. Now in Euro' Scrambling 3, John McCormac analyses all of the latest hacks and scrambling systems

Only £32.00 inc. P&P

PRACTICAL GUIDE TO BUYING, SELLING, REPAIRING AND SERVICING USED CD's, TVs and VCRs

They cover everything from choosing good ex-rentals to covering more stock faults for common ex-rentals than elsewhere at many times the cost. These are brilliantly practical and inexpensive repair and service systems

Only £9.95 each or £25.00 for all three

INDEXES! INDEXES!

THOUSANDS SOLD WORLDWIDE

EDITION 10 of the complete indexes now published containing over 8,000 Faults listed in 12 Years of Television Magazine

Indexes are alphabetically listed by Make,Model,Fault,Ref and are now Available for just :

£8.00 For Television & Satellite Faults

£8.00 For Video, Camcorder & CD Faults

Or

£15.00 For both sets complete

Please add £1.50 (UK), £3.00 (Overseas) to total order to cover post & packing.

A LOW COST UPDATE SERVICE IS ALSO AVAILABLE. FULL DETAILS DESPATCHED WITH ORDER.

To secure your copy/s please make Cheques/Postal Orders payable to:

E.C.S. 31 PRENTON ROAD WEST, PRENTON,BIRKENHEAD, MERSEYSIDE L42 9PY

PANASONIC "G" DECK

Disassembly and reassembly on the easy to follow video.
Made by engineers for engineers only £19.95 FREE P&P. (Else £6. Overseas)
Make cheques/PO's to:
Paul Stuhlfelder
Pulse Video (Dept TVAI)
2 Greenacres Drive, Morfa Bychan, Porthmadog, Gwynedd, N. Wales LL49 9YG

SERVICE INFORMATION

CIRCUITS & SERVICE MANUALS FROM 1940s – 1990s: radios, amps, radiograms, tuners, CD's, TVs, Videos, cassette, radios, ICE etc LARGE QUANTITY USED TV PANELS BACK COPIES PW, RADCOM TV MAG
Give details of your needs to:
DAVE WILLIAMS
Tel & Fax 0302 857526
23 Florence Ave, Balby, Doncaster, South Yorkshire DN4 0QB

SERVICE MANUALS

For most U.K. European, Far East & USA types of TV – VIDEO – CAM – SAT – M/WAVE – CD and all at reasonable prices
VCR circuits also available separately for some models
Some examples from thousands of video manuals available.
These are all complete at £10 each + £1.50 p/p, no VAT.

PANASONIC NV-FS100, L20, NV-MC10, MC20, MC30, ORION D500, D1000/1100, D1200, D1500, D2000, D9000, GRANADA/TASHIKO – any VCR after 1988.
For other makes & models phone for price & availability.

LSAE brings free list of what's available this month.

D-TEC
PO BOX 1171, FERNDOWN, DORSET BH22 9YG
Tel: 0202 870656

AMSTRAD, LOGIK, MATSUI-SAISHO FAULT FINDING GUIDE

Covers hundreds of faults on a wide range of television and video recorders. Professionally compiled in easy to locate format. SAVES TIME AND MONEY by pin pointing faults in record time.

SEND £9.95 + £1.00 p.p. TO

R. ROWLAND
438 Poynters Rd, Luton, Beds. LU4 0TW

SERVICE MANUALS

We have what is probably the largest range of Service Information available anywhere.

From the Earliest Valve Wireless to the Latest Video Recorders. Colour Televisions, Test Gear, Audio, Computers, Amateur Radio, in fact practically anything.

Originals or Photostats as available.

Also available. Our FREE catalogue detailing Hundreds of Technical Books and Repair Guides available.

Send 2 x 1st class stamps for your copy TODAY.

Mauritron Technical Services (TV),

47A High Street,
Chinnor,
Oxfordshire,
OX9 4DJ

Access VISA

Tel: 0844 351694 Fax: 0844 352554.

No. 1 For Fault Guides & Repair Data

Pick-&-Mix Fault Guides

Our selection of common stock and standard faults for various manufacturers

Choose any TEN manufacturers for only £4.95!

Akai, Alba, Amstrad, Ariston, Bendix, B&O, Bush/Rank, Decca/Tatung, Doric, Ekco, Fidelity, Finlux, Fisher, GEC, Grundig, Hitachi, Hinari, ITT, JVC, Korting, Lowe, Luxor-Skantic, Mitsubishi, Murphy, Nordemende, Orion, Panasonic (basic), Philips, Sanyo, Sentra, Sharp, Sony (basic), Telefunken, Toshiba, Triumph, Zanussi.

Giant Compendium (all above + Ferguson) only £9.95 (normally £16.95)

(Fault & Diagnostics Pocketbook for Ferguson TX90/TX100 only £4.95)

TV AR Fault and Servicing Guides (£16.95 each)

Vol. 1: (includes CTV's, CD's, Assortment of Audios).
Just some of the models: CTV's – Hinari CT4 to 7, Decca/Tatung 130/140/150/160 series, Philips System 4, ITT Digivision.
CD's: Alba CD210, CDS200A, Fisher AD-M Series, Philips CD100/150, FCD 563/565, Sony CDP101/102/103.
Audio: Automatic Turntables to Synthesizers and from Akai to Toshiba.

Vol. 2: (includes CTV's, Computers, Satellite Receivers, VHS-C Camcorders).
Just some models: CTV's – Ferguson TX85/86, TX90/100, Panasonic Alpha 1/1W Chassis, Philips 2A/3A.
Computers: Atari ST versions 520/1040.
Satellite: Amstrad SRX100/200, SRD400, Ferguson SRB-1, SRD2/4, Pace SS3300.

Each book has a binder full of the matching Circuits Available at £39.50 each

Video Fault Finding Guides (5 books per series)

Series 1: Ferguson 3V00, 3V01, 3V16, 3V22, 3V23, Baird 8924, JVR HR-4001, Philips N-1500/N-1502, N-1700/N-1702.
Series 2: Ferguson 3V29/30, Baird 8930/40, Philips system 2000, Sanyo, VTC5000, VTC5300, VTC9300 (& "P" version), Toshiba V5970 and Clones.
Series 3: Baird 8931, 8942, Ferguson 3V31/32, Panasonic NV7000, NV8000, Philips/Pye 22VP600/700, Sharp VC2300, VC7750, VC8300, VC9700.
Series 4: Fidelity VTR1000 and Clones, Panasonic NV100, NV8600, NV8610, Philips VR6460, VR6560, Sharp VC108/408/651/681.
Series 5: Ferguson 3V35/36/38/39/43/45/48/53, Hitachi VT11, VT8000, VT8500, GEC V4100, Panasonic NV370, Philips 6920.
Series 6: Grundig VS300/310/320/340/380, Hinari VXL8/9/10 & Clones, Hitachi VT410 to VT450, Panasonic NV730/777/778/788, Sanyo VHR3100, VHR3800.
Series 7: Ferguson 3V58 to FV11/12, Goldstar GHV/GSE1290-1296, Panasonic later D-Deck, G/G1 Decks, Sharp VC381 to VC387.

(Please note: the above are not full listings, only the main models from each series, they actually contain more information). ***Only £12.95 per series or £79.95 for all.***

INFOTECH VISA

76 Church Street, Larkhall, Lanarkshire ML9 1HE

Tel: (0698) 883334 – (0698) 888343

Fax: (0698) 884825

Please add £2.00 for post & handling (orders over £30.00 FREE POSTAGE)

INFOTECH VISA

76 Church Street, Larkhall, Lanarkshire ML9 1HE

Tel: (0698) 883334 – (0698) 888343

Fax: (0698) 884825

Or Send a large SAE for your FREE catalogue of 100's of publications. Please add £2.00 for Post & Handling on any order (post free on orders over £30.00)

We have the world's largest collection of:

"SERVICE MANUALS",
"SERVICE SHEETS",
"CIRCUIT DIAGRAMS",
"FAULT-FINDING GUIDES",
"REPAIR GUIDES",
"CIRCUIT DESCRIPTIONS"

For CTVs, VCRs, CDs, Satellites, Midi Systems, Computers, Amps, Oscilloscopes, Mono TV's, Radios, Camcorders, Walkmans, Car Stereos, Tape Decks, Printers, Photocopiers and almost everything else!

!!We've got the lot!!

Data Reference Guide (4th Edn.) ***Only £5.95***

With over 120 pages and incorporating a full "chassis guide" and Cross-references on every piece of CTV, CVR, Audio, Domestic and Test Equipment we can find! It is still the best guide on the market.

We Also Run the Largest Data Library in the United Kingdom
(Please ask for details)

Phone/Fax or write for a FREE quote on any model
Orders usually sent "same day" as the order is placed

FAST FIX

Fault Index

Now in NEW A4 Book Format, containing over 200 pages.

Still thumbing through back issues of 'Television', looking for the cure to that frustrating fault? Why not let the FAST FIX Fault Index find it for you? Covering the years 1982-Dec 1993 and listing over 3000 TV, Video, Camcorder, CP and satellite fault symptoms + hundreds of technical references from Television, FAST FIX could pay for itself after just one repair. All references are arranged alphabetically listing make, model, fault symptom and page reference. Regular updating takes place and all customers will be notified.

Complete FAST FIX index £16.00 inclusive.
Overseas orders please add £3.00.

MONEY BACK GUARANTEE IF YOU ARE NOT COMPLETELY SATISFIED

Send Cheques/Postal Orders, payable to:
J. Humphreys, 13 Mansfield Avenue, St. Johns Park Hawarden, Clwyd CH5 3SB N. Wales
For further details, tel: 0244 532961

Vintage Service Data. For all your requirements on valve & early transistor equipment. Contact *"Savoy Hill Publications"*, Warrens View, Wrington Hill, Wrington, Bristol BS18 7PR.
Tel: 0934 863491 10.00am to 7.00pm.

TRAINING

If you require a home study course in the fundamentals of electronics, either to begin a career, pursue a hobby, or refresh your knowledge, a

BASIC ELECTRONICS

course, from the Direct Personal Learning scheme, could be just what you're looking for. Contact:

K. Sparrow etc . . . 11 Claydon Green Whitchurch BRISTOL Avon BS14 0NG
Telephone: (0275) 835669

TV VIDEO FAULT GUIDE LINE

FRYERNS

Most makes covered old and new. This service offers technical advice and cure plus Schematic diagram all for the price of £3.50

Access and Visa Fax Service

Phone **0268 558938** Anytime

4 Pincey Mead, Basildon, Essex SS13 3EW

SPARES & COMPS

SURPLUS/REDUNDANT ELECTRONIC COMPONENTS WANTED

I/Cs – Tuners – Transistors – Valves – Diodes etc. any quantity considered – immediate payment.

ADM Electronic Supplies

Tel. 0827 873311. Fax 0827 874835

WIZARD DISTRIBUTORS

Spares + Components
Always in stock
Video heads for over 500 models
Spares for over 20 manufacturers
Hand sets for over 200 models
TV Tubes new + regunned

Plus much much more

Empress St Works
Empress St
Manchester M16 9EN
061-872 5438, 061-848 0060
Fax: 061-873 7365

TUBES

REBUILT CRTs

VDU – MONITOR – TV

Image Burn-In Removed From Screen Phosphors

B.S.I. Certification

N.G.T. ELECTRONICS LTD

120, Selhurst Road, London SE25 6LL

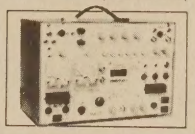
PHONE: 081-771 3535

Britain's Oldest Established Tube Rebuilder

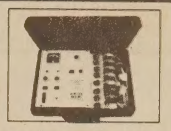
TEST EQUIPMENT

MÜTER · AT2 · BMR95 · BMR700

AT 2, Audi-Multi-Tester, 16 test-circuits for loudspeakers, tuners, amplifiers, headphones, tape recorders, mikes, boosters,

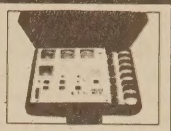


car radios, CD-players; measurment of millivolt, drift, watt, performance; with generator, radio, signal tracer/injector, 13 volt supply etc.



BMR 95

BMR 700



Regenerating Computers & Measurers for CRT's with cathode protection, gas clean-up aid, short repair; exhausted CRT's becomes bright and sharp again even if all other machines do not succeed.

United Kingdom: P & E Services, Llandudno, Tel. (0492) 549246, Fax 547880.
Ireland: Dönberg Electronics, Ranafast, Co. Donegal. Tel: 353 75 48275 and 48532. Fax: 353 75 71031.
New Zealand: TDON Ltd., Onehunga, Auckland. Tel. 6 68-9 07, Fax 668-4 99.
Germany: Ulrich Müter, Oer-Erkenschwick, Fax (0 23 68) 5 70 17.

TRANSFORMERS

TV LINE OUTPUT TRANSFORMERS

PHONE 081-948 3702 FAX: 081-332 0583

ALBA . AMSTRAD . BUSH . DECCA . DORIC . BLAUPUNKT.
FERGUSON . FIDELITY . GEC . GRUNDIG . GRANADA.
HITACHI . HINARI . INDESIT . ITT . KIMARA . NIKKAI.
MATSUI . MURPHY . OSAKI . NORDMENDE . LOEWE-OPTA.
PANASONIC . PYE . PHILIPS . SANYO . SAISHO . SHARP.
SONY . SOLOVOX . SUSUMU . TANDBERG . TELEFUNKEN.
THORN . TRIUMPH . THOMSON . GOLDSTAR . BINATONE.

FULL RANGE OF KONIG: VIDEO HEADS, BELT KITS, IDLERS, PINCH ROLLERS, TENSION BANDS. LARGE RANGE OF REMOTE CONTROLS IN STOCK

TIDMAN MAIL ORDER LTD . 236 SANDYCOMBE ROAD . RICHMOND . SURREY . TW9 2EQ.
Approx. 1 mile from Kew Bridge.
Mon-Fri 9 am to 12.30 pm & 1.30-4.30 pm
Sat 10 am to 11.45 am

MISCELLANEOUS

CAR RADIO DECODING EQUIPMENT

Plug our decoder into your IBM or compatible computer, remove the base plate from the radio, place our probe onto the PCB and the code is instantly displayed. Changing the code or even fully reprogramming the eeprom is just as easy.

Easy to use software includes PCB layouts and help screens with full backup from our telephone helpline.

PHONE US NOW FOR INFORMATION PACK AND FREE DEMO DISK
(Please state either 3.5" or 5.25" disk)

Starter kit covering the three most popular brands
£300 + carr & VAT

EEPROM DECODING SERVICE: only £5 + VAT
(just send us the chip)
FORD 2006, 2007, 2008, 2040 DECODED FOR £15 + VAT
FORD 2006 front panel DECODED FOR £10 + VAT
GRUNDIG SC-303 DECODED FOR £15 + VAT
Prices INCLUDE return carriage

Electronic Sound Systems

62 High Northgate, Darlington, Co. Durham DL1 1UW
Tel: 0325 484089 Fax: 0325 465921 Mobile: 0860 221 099

TEK-HELP

HOT LINE FOR TV & VIDEO REPAIRS
THOUSANDS OF FAULTS & CURES
ALL MAKES
JUST THE COST OF A PHONE CALL

0891 516 434

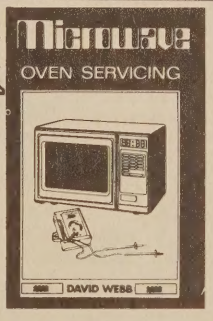
48p PER MIN 36p CHEAP RATE

HOW THEY WORK! HOW TO TEST! HOW TO REPLACE!

Designed specifically for Domestic Appliance Engineers who want to enter the fast growing microwave Industry. Packed full of useful information, presented in a simple yet informative style with comprehensive diagrams and illustrations. Fault finding procedures are included at the end of each section. The book contains easy to follow electronic control systems.

£14.95 plus £1.25 P. & P.

ORDER YOUR COPY TODAY!



We also supply microwave oven components

SWIFTPARK LIMITED

113 LONDON ROAD, HORNDEAN, WATERLOOVILLE, HANTS. PO8 0BJ

CAR RADIO CASSETTES

Do you turn away work on car radio cassettes because they have security codes.

Most radio cassettes can be decoded just by replacing the eeprom (memory IC) with that of a known code, or sending the original for recoding.

Send now for introductory offer, one of each of most popular eeproms plus comprehensive eeprom/radio decoding list. Offer includes Philips X2402P: Ford MN010: Blaupunkt Boston CC20 9346 **£17.63**
Original eeprom re-coding service **£4.99**
Radios sent for decoding from **£16.69**
Inclusive of VAT and p&p
99% all radios covered

RADIO DECODING EQUIPMENT

Our software package to run on all IBM and compatible computers including laptops and notebooks, consists of Ford, Philips, Blaupunkt, Pioneer, Clarion, Panasonic, plus many more may be added. Included is all necessary probes and interface (no batteries required). Reads and writes codes in seconds. No technical skill is needed...all help is built in. **£299 + VAT**

For technical or general information phone

0543 572523

C.D.H. ELECTRONICS
3 Common Walk, Huntington, Cannock, Staffs WS12 4NB

LINEAGE

FOR SALE: Video Camera/camcorder servicing equipment system video vectorscope, unused test charts (log grey scale and colour) unused lix meter, over 250 current model service manuals from various manufacturers, 100 plus training manuals e.g. Panasonic, Hitachi, Grundig, Sanyo etc, Vectorscope in excellent working order, charts cost over £350 alone, manuals worth over £2000, to be sold as a package for £2500 ovno. Tel: (0533) 640787 after 6pm.

WANTED, VALVES TRANSISTORS especially UK manufactured EL34, KT66, KT77, KT88, PX4, PX25. Please post list of what you have, cash waiting. Billington Export, 1 E Gillmans Ind Estate, Billingshurst, Sussex RH14 9EZ. Callers strictly by appointment only. Telephone 0403 784961, Fax 0403 783519.

VIDEOCRYPT DECODER Service sheet with smartcard contact details Eurocrypt card interlace £12. E.M.O. Ramsbottom, Lancs BL0 9AG. Tel: 0706 823036.

Microwave Oven Component Parts

Guaranteed Quality **Guaranteed Products** **Competitive Price**

AWI LTD
A KEY PART OF MICROWAVE

AWI Ltd Samuel Whites Estate, Medina Road, Cowes, Isle of Wight, PO31 7LP
Tel (0983) 296121 Telex (86736) Sortex G Fax: (0983) 296122

MARCONI COMPACT L.N.B.
1.2DB £30
10.7 TO 11.7GHZ

60cm BACK MESH DISH £20, £5 post

12v Satellite Receiver with hand set £30
Switched Mode Trans 3112. 338. 32642 Ferguson £1

VIDEO AMSTRAD HANDSETS (EXPORT) £2.50
WILL WORK IN HOME MARKET
6.000 and 4.600 4.700 £5

SEND FOR DATA D2 MAC SATELLITE RECEIVER, LNB AND DISH. £50 (£10 Post)

SATELLITE RECEIVERS — New Ferguson BSB Chassis with Tuner, Modulator etc £10
Hand Set £1.50 £4 Post

60cm SATELLITE DISH £35 Postage £5

SATELLITE FINDER KIT AND LNB TESTER WITH METER BOX £25

PB500 Panic and Button Transmitter 180MHz £1.00
G11 CAP 250V, 470M £1.35

Scart to Scart all pin connected £2.50

Miniature Xmas tree with flashing LED's (12) £7.50

New Eprom for converting Ferguson BSB Receivers to D2 MAC and PAL – 99 channel is tunable and each one can be put into memory – also has menu. £20
PAL panel (to convert to PAL) £20
SEND FOR DATA

TELEPHONE BATTERY SANYO 3.6V 250/MA – £3

VARTA 3.5V 280 M/A £3.00

PHILIPS C.D. MECH. 691-30212 £14.00

SMALL SATELLITE TUNERS (950 to 1750 MHz), L.F. frequency 4000MH ..... £9.00 each
VHF/UHF S.BAND TUNER £3.00
DAM MAINS CHASSIS AMSTRAD MONITOR C £10
UNIVERSAL TRIPLER. NEW TYPE £4.00
VIDEO LEADS 80p
AMSTRAD Line O.P. Transistors with Diode 2SD/453 ..... £1.00
VIDEO LAMPS. Long Lead 24p
HITACHI & GEC FRAME, Thick Film £6.00
FIDELITY SPLIT DIODE ..... FCC2215AE....£20 FCC2015BE....£10 FCC2215BE....£10
K30 FRONT PANEL TEL-TEX TYPE £5.00
NEW G11 LINE OP PANEL £8.00
PHILIPS YEARS AHEAD
THE CREDIT CARD CALCULATOR Solar Powered £3.75
NEW PHILPS SBC 1833 Solar & Battery Powered Calculator £8.00
THORN PANEL TX9 REC & REMOTE PANELS with Mains Trans £5.00
TX10 REC & REMOTE PANELS with Mains Trans £5.00
TX100 FRONT PANEL £5.00
TX10 TUBE BASE ON PANEL £3.00
TX91F £2.00
THORN PANEL No.515-353, 548.02, 565-01, 509/102, 515/173, 508/161 ..... £5.00
THORN TX STEREO SOUND O.P. PANEL (I.C. TA7227P) £1.00
THORN VIDEO AERIAL AMP 01 M4-597-001 ..... £6.00
ULTRASONIC TRANSDUCER 15p

CAMCORDER SANYO NP22 6v 1300mah Rechargeable Battery Pack £6.00

SATELLITE UNIT
Video Out/Audio Out, L and R Polariser ± 35M/A and Decoder Socket
£10

Gas Soldering Irons **New Type £10.00**
Variety Nickel Cadmium Batteries from Telephone Type to Sub-C.50p per cell. Mainly in packs of 6 to 8.

HITACHI UHF-VHF SMALL TUNER
ET598A £5.00
ET595A £5.00

GREY OR BLACK £1.50 5AMP MAINS LEAD WITH PLUG SOCKET FOR TEST EQUIPMENT ETC.

06D4-025-001 Mains input choke for TX9 £4

THORN M494B1 on Remote Panel £5

THORN FRAME IC TX100 etc IC TDA 3652 IS OBSOLETE REPLACEMENT TDA 3654 £1 EACH

TX100 REMOTE PANEL
No.56413IC M293B/and SAA5012 £10 etc

144MHz Changed Over Relay Aerial 50p

6251 FRAME O/P THICK FILM HITACHI GEC £9.00
THICK FILM HITACHI HM9205A £4.00

NICAM UNIT — Ferguson made for ICC5 Chassis — home market and export — has circuit diagram and can be converted to most sets — £15.
TOSHIBA Nicam panel & IF export only has the Toshiba chip set £8.50

TX 85 FERGUSON BATTERY MAINS CONVERTOR £5 each

TX9-TX100 FRONT PANEL £5 WITH REMOTE £10
NON REMOTE 8 push button £10

LARGE Foacs Pots. Fits Pye, GEC, ITT, Decca 75p

BSB SAT/REC HALF COMPLETED. CHASSIS, TUNER AND MOD £5 + Post £3

PHILIPS NEW TYPE U/V HANDSET £10

GLASS BEADS Diodes 200v/1.2A 50 for £1.00

G11 LOPT Panel £4.00
G11 Tip Switch £20.00
G11 IF Panel £3.00
G11 Decoder Panel £2.00
G8 Push Button Unit £2.00
G8 Con/Panel New Back Type £4.00

MIXED TOSHIBA HAND SETS FIVE FOR £12

Have you got Acid Rain in your garden? PH METER £5.00
Video Power Supply for Amstrad. Last year mods. £1.50
Mains Transformer for Amstrad Video 25p (£1 post)

LATEST VIDEO
For Latest Philips, GEC, Pye and Hitachi, Front panel with memory chip and bush button and pots and LED's £6.00 NEW

FERGUSON CHASSIS
IKC-2000 £20 TX86 Chassis £14
TX90 Chassis 14" £15
8 PUSH BUTTON £15
Post each, £5

TX100 FRONT PANEL £5 8 Button

GEC, HITACHI DECODER PANEL TBA810AS, TBA120, HA1/215A, UPC1365 £10

SCART TO SCART LEADS
TX90 REMOTE PANEL IC TMS1000 AND M293 £12

5 Mixed AMSTRAD **VIDEO MOTORS** £5.00

SATELLITE TUNER UNIT 2427611 with Base Band, Video Out £6.00

SALORA SAT RECEIVER CONVERSION KIT
For models 24M60, 25M90, 28M90, SB1206E, SB1365
£15

TX90 TO TX100 8 BUTTON UNIT £4.00

TX10 8 way button unit £8.00
24v O 24v 3Amp MAINS TRANSFORMER £3.00
10 MIXED FERGUSON CIRCUIT DIAGRAMS £5.00
MSH1FCF09 £?.??

PHILIPS UNIVERSAL BATTERY TESTER SBC 1695 £5.00

BATTERY CONVERTER FOR TA185 FERGUSON TX85 £8.00

ONE I.C. K35 Decoder £10.00 PHILIPS Deck Calculator £7.00

REGULATED PWR. SUP. 500M/A 1.5V-12V DC switched + & – £5.00

MADE BY PLESSEY – MADE IN ENGLAND
New public telephone exchange original price cost £299.00
Network exchange line
(at home or in a small business) has two telephones and cables and NS5107 control unit
SPECIAL PRICE
£54
Send for data

DECODER C-CAM
PHILIPS MADE for K40 CHASSIS
IC No. TDA 3590
£5.00

56420A 20A/600V THYRISTOR £1.75

LCD VIDEO AMSTRAD HANDSET for models 1900 £8 each

ITT BG2032-642A TRIPLER £5.00

ITT/NOKIA RF IF MODULE £20

COAX PLUG TO PHONO LEADS £1

TV GAMES AERIAL VIDEO COMBINER SWITCH £1.50

MIXED 20 BRIDGE RECTIFIERS (1 Amp to 5 Amp) £1.50

TX100 SWITCH MODE TRANS 5157/48 £5 AND 00D4252001 06D3082001

STEREO SOLAR RADIO VHF AND MW £10.00

1000V AC 1000V DC ETC. PHILIPS METER ANALOG £11

G11 470 MFD 250v £1.35

420M/400 £1
220M 3850 £1

12 Volt Relays 35p with D/P changeover

PHONO I 'O LEADS 3 Metre 30p

LEAD SCART TO D PLUG 50p

BRIDGES RECTIFIER
Mixed BR-31 to 34
2 Amp to 5 Amp ..... 8 for £1.00

G11 8 WAY TIP SWITCH WITH DARW ASS £10

1 METRE SCART LEAD £1.00

VIDEO SCART TO SCART ALL PIN, LONG LEAD £2.50 ALL PINS

TX90 TX925 TX100
Mains Switch with Stand-by and Lead
50p each

BURGLAR ALARM
USE INFRA RED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY

2433752 £20
2432984
2432871
2432301
2435016 **£15**
2433952
2434393 **EACH**
2432211
T9048A
DST85B243
TFB3069D
K4 L.O.P.T.
K40
2433452
2432904
2434451 £14

SPLIT-DIODE
2433752 £15
TX100 Green Spot £15.00
TX100 Yellow Spot L.O.P.T. £10.00
TX90 White Spot L.O.P.T. £15.00
Split Diode 110° £12.50
Orion 65-3M
GEC 85-9793-6
TX9 Thorn 2432101-2 £5
2434141 EACH
2434492 **£10**
2434493

DST 81N243
TFB4023AD £10.00
MSH1FPT131 £12.00
MSH1FBW27 £12.00
DST186N243 £10.00
3220029 £10.00

TOSHIBA
DST 186N243 £10
TFB-4023AD £10
CP90 Philips Split Diode £10.00
2435141 £15
2432491 £10
2435065 £15

36761
36881
2692120/10
37051
CTK Lopt
36212
33651
36072
36362
36482
36761
36831
36832
36833
36921/79
36922/79

TX85
2435701
2434393
2435016
2435014
£10
2436797
£15

TRANSFORMERS
24357/01 £10
2435012 £10
FERGUSON
47003481 £10
AMSTRAD TVR3
LPTS £10
TFB3069D EQU
TFB4009AN

AT2036/00 AT2076/55
AT2048/11 AT2076/71T
AT2055 RCO ST CT3325
AT2076/35 OT2041
AT2076/38 FB165KA Orion
AT2076/51 2076/51
CVC 820 2432461 2433451
CVC 800

BRIDGE RECTIFIERS
10 FOR £1.00
4 Amp for Video Power Supply

SHARP MSH1FCF09
£10 EACH FIT MOST SETS New Thorn 0004-235 Hand Set 002-01 Type u/v **(£10)**

VIDEO MOTOR for VT568 type VC62DD8 **£8.00**
AMP TUNER IF for VT568 Hitachi & GEC **£9.00**

SATELLITE TUNER
950MHz-1750MHz £5.00

TTT PANEL
CMC 301 CMC 113 CMC 302
CMC 115 CMC £5.00 303 CMC 96/4

VIDEO LEADS
4 for £1

SEL ITT
IFB254F/2 Front Panel
£15.00

DECCA — GEC — ITT
6 push button **£5.00**

BURGLAR ALARM £2.00 with siren 9 VOLT

25 Way Plug and Socket with Case £1.50

PHILIPS HAND SET G11 TEXT ULTRASONIC £10

G11 TEXT IN RED HAND SET £15.00

G11 HAND SET ULTRASONIC £10

PHILIPS RC5 EASY CONTROL £10

TRV3 Amstrad Cassette Mechanisms. New with 2 motors and sound head. £15
£5. Amstrad Television Tuner UHF. Small, Fits most Amstrads. £6.

SENDZ
SEE BACK PAGE

FERGUSON SAT HAND SET
SR D1
SR D2 £3
SR D3
SR D4

FERGUSON ICC5 STEREO O.P. PANEL ICs TDA8405 TDA8421 TBA1204 £10

U/V 6, DIODE TRIPLERS **£2.00**

4600 TO 8600 AMSTRAD VIDEO HAND SET WITH LCD £10

NICAM MkII KIT MODULE £20.00 with data

Burglar Alarm Has time delay to set £2

Mains Transformer £4.00
240v in 110V to 120v out 1 amp post £3

SENDZ COMPONENTS

0702 338894

(To order see back page)

LA11440 **£1.00**

M58484P **£2**
HA51338 SP **£3**
TAA7750 **50p**
HA11485ANT **£2.00**
UPC1373 **50p**
M58657P **£1.00**
M491BB1 **£3.00**
M50441/550 **£1.00**
M58658P **£1.00**
M50430 – 850 SP **£3**
M50143 – 011P **£1**

Receiver TX100 Panel
I.C. No. SAB3035
—MAB8440P D066
—SAA1060
—PCF8571P **£10**

TMS9129NL **£5**

20 off £2.00 High Voltage Condenser IN5 to 8NZ 1500V to 2KV **£2**

TX9 C.CAM Decoder **£5.00**

4 Types Fidelity front panels with i.c. & pats **£2.00 each**
BB 103 **10p**
BB 105A×12 **£1.00**
BB 105B×12 **£1.00**
BB 105G×12 **£1.00**
BB121a **10p**

1A/1600V **10p**
DG3P EQV – BY228 **10 for £1.00**
2 amp bridge rec. wire end **15p**
SKE4G2/02 **15p**
Eqv. BYX71/600 500ns.

6 Push button switch ITT GEC **£3.00**
CVC45 ETC

Hitachi T/V IC HA51338SP/3 **£3.00**

TT14 GEC TEX-DECODER
13 IC Panel with cable form **£9.50**

PHILIPS
Decoder SAA IC 5020-5030
5040B-5050
K40 Text Panel **£8.00**

ICC5 TUBE BASE ON PANEL **£5.00**
ICC5 DECODER PANEL **£15.00**
ICC5 TEXT PANEL **£15**

K35 Decoder **£8.00**
K35 Sound OP **£4.00**
Thick Film Daughter Kt3 33122-127-43891 **£3.00**
12 CH. K30 Tex Rec Front Panel with I.C. **£5.00**

Plug in
K4 Focus Pot K40 **£1.00**

Fidelity Tube Base with transistor & focus pot **£1.50**

TX10 Tube Base on Panel **£3.00**

PHILIPS HAND SET
K35-K4-K40, etc **£10**

Universal Tripler
with small focus pot. Green type **£7.00**

THORN CASSETTE HOUSING
PAS26805U **£18.00**

LITHIUM BATTERY
BR-2/3 Volts **20p**

TUNER. SAT 2000 KHC **£8**

HITACHI, IC
D1514C.036 **£3**
D1514C.046 **E**
MN1250BJC **A**
ST6393 B1/IY **C**
HD6140805A90 **H**
TMP47C1637N
M50442-553SP

TUNER UNITS
TX90 TX190 Tuners with AE socket **£7**
Thorn TX Tuner V/Cap eqv. to ELC1043 **£4.50**
Thorn TX10 Export V/Cap UHF, VHF **£3.00**
ENV 57836G2F UHF/VHF Small **£4.00**
NEW G8 Tuner V/Cap **£3.50**
ELC2000 on Panel **£2.50**
EG613F **£7.00**
VHF/UHF 2 BEOT545A **£6.00**
ELC2000 **NEW £4.00**
ELC2003 **£4.00**
GEC Tuner V/Cap Hitachi After 1979 ET548, ET547, ET541B **£8.00**
ET546 **£6.00**
ET598A UHF/VHF Miniature Tuner Hitachi **£5.00**
ELC1042 **£6.00**
ELC1043 **£6.00**

Monitor Astec UM1233 **50p**

UE33-B01 Amstrad UHF Tuner **£5.00**
VHF/UHF EG522F **£6.00**
ASTEC UM1183 **£10.00**
V314 (VHF) **£5.00**
V334 **£4.00**
U321 **£6.00**
U341 UHF **£6.00**
U342 (UHF) **£5.00**
U343 Phono **£5.00**
U344 Coax **£6.00**
U343C **£6.00**
U344C **£10.00**
U411 UHF **£4.00**
UVF10 **£8.00**
UV411 Tuner **£8.00**
UV417 **£5.00**
UV618 Tuner **£5.00**
UHF/VHF Tuner 1500 DKO **£5.00**
U743 Tuner **£3.50**
U944 Tuner **£5.75**
Fidelity/Amstrad 2000 V/Cap Tuner **£5.00**
Small V/Cap Mitsumi – UHF **£4.00**
– VHF **£3.00**
Portable & Rotary Tuners Sanyo & Mitsumi UHF **£5.00**
Mosfit UHF/VHF (new type) **£8.00**
UF2-B31 Fidelity V/Cap T/Unit **£6.00**
UHF-VHF V/Caps on panel **£3.00**
HITACHI 20 Turn Pot **40p**
U321 ca panel **£6.00**

Mullard Video Modular, Application, video tape recorders. TV cameras, video games, closed circuit TV, C.C.I.R. system. Data supplied **£10.00**
T85 250v AC mains filter 0.1+(03x2)11" leader & earth clip **25p**
NEW U321 Mullard **£4.00**

Astec UM1623 VHF **£2.00**
VHF/UHF Tuner S Band **£3.00**

ENV-5765G2 VHF/UHF **£5.00**

Change over switch co ax type box with lead **50p**

UF 7496 Tuner **£5**
EF 321 **£5**
EG 311F **£5**

UF744 BAV **£3**
UF745 BAV
UHF Tuner and IF in one can (small) **£5.00**

Co-Ax Belling Lee Plug **14p**
Co-Ax Splitter **£1.00**
Infra Red Emitting Diode **20p**
NE286H Small Neon Lamps
GEC & Phillips **5p**
Mullard 5 Watt Amps. LP1162 (New) **£75**

WE HAVE OVER 250 TYPES OF STK AND STR I.C.S. SEND FOR LIST

85-4538-3 Tatung GEC 8 Button Unit Print Type 1990 to 1992 **£5.00**

Philips Handset IC **£3.00**
SAA3010P **£3.00**
MAB8461/WO63 **£3.00**

BG 2087 – 642 – 1005 Tripler Grundig **£7**

Ferguson Hand Set for IK 2000 and IK 7000 **£8**

Ferguson 00V3 – 913 IC AM748D3 **£5**

FERGUSON ICs
Ferg-TX982 **£3.00**
TMP47C 634N 2685 **£3.00**
ST6391B1/B2 ICC7 **£4.00**

CMC 301 front panel **£5.00**
CMC 303 front panel **£5.00**

International Rectifier EHT Diodes G770/HV34 6KV **3 for 8p**
6A/600V Stud Diodes **20p** BTW 92/800R **£3.00**
6A/1000V Stud Diodes **20p** 24A473 PNP C/P **10p** DL 711 Mullard **£1**

Sweep Tuning
TX90 Remote Panel No 139-001 – I.C.S. M293B1 and TMS 1000N 2LL **£12.00**

Turntable Satelite Modulator TV **£1**
Sound 5.5MHz MPM 1000T **£1**
Sound 6.0MHz MPM 1040 **£1**

FEROX
RF Filter Clamp for CoAx Cable
Circuit for detecting R.F. Send for circuit using clamp (25p each)

Ferguson Switch Mode Transformer TX85, TX86, TX100 **£3.50 each**

ICC5 Ferguson Switch Mod Trans 3112-338-32642 **£4.00**

12v DC and 24v DC power supply regulated **£2**
ICC5 L.O.P.T.
DST 88B243
DST 85B243 **£10.00 each**
Thorn Mixed **£10.00**

Ferguson Hand Set
ICC5
IK2000 **£5**
IK7000

KT3/K30 T/Text **£12.50**
KT3/K30 Full remote **£15.00**
Pye & Philips handset KT3-K30 chassis. No RC5150-RC5176-RC5071-RC5177.
Special Price **£13.00**
RC4001 KT3 and Teletex **£14.00**
TX10 Hand Set Text **£12.50**
TX9 with Text **£12.50**
TX9 & TX10 button print **£2.00**
TX10 Focus Pots **£5.50**

Mains Stand By Switch with Coil **£1.00**

PHILIPS
UNIVERSAL HAND SET £12.00 RC5 KT3 – K45 – £10.00

We have all parts for Philips Handsets

RC5353
RC5300 **£10**
RC5176 EACH
RC5177

TEXT-TYPE
Replace Hand Set for
Philips KT3-K30. K4 etc **£12.50**

THORN HAND SETS
9000 – 9600 – TX9 – TX10 – TX100
Text and Non-Text **£10.00**

PHILIPS
RC5171 (HAND SET) **£12.00**

K35-K4 HAND SET
Repaired for £5.00

SANYO MAGMTRON
Type 2M218H **£10**

B.SKY.B
VHF TO IF **£5**
BLOCK CONVERTER

10 Panels Ferguson
Mixed from TX9 to ICC5 **£20**

TV Aerial Ring Type **40p**

TX100 Remote Hand Sets **£6**

Philips Video Remote Hand Set
Works most sets. No L.C.D. Display **£5**

ITT-Nokia Tuner IF
RF-IF-Module 5829 02 58 **£6**

SEL-ITT HF-Module 2 UK 5828-04-10 **£6**

01 M4- 412-001-RU1 **£3**
8 Way Pre sets for TX10-TX100

01 V6-251-002 Text Panel ICC5
Ferguson **£10**

Sharp Tuner and IF 1810587 PAL1 UK **£3**

Tuner IF UE30-BO 3 Amstrad **£3**

PHILIPS RC5410P HAND SET £8

ICC5 E/W COIL £2

EARLY BIRD SAT TUNER WITH 950–1750 MHz
BASE BAND £8 WITH DATA

FERGUSON LOPT FST 24" TX100 – 260482
£15

LOPTS AMSTRAD 3714016 £5 3216001 £5

TOSHIBA REMOTE CT9123 £4

TV GAMES COMBINER SWITCH £1

AMSTRAD SANKYO
CAPSTAN MOTOR 6,000 £3
AMSTRAD LOADING MOTOR 6,000 £1

GRUNDIG TRIPLER BG-2032-642-3002 £5

HAND SETS FOR 6000 SERIES AMSTRAD FOREIGN ORIGIN WITH L.C.D. £2.50

FERGUSON PAY HAND SET 4 FOR £1

TOSHIBA REMOTE CT9233 AND CT938 £3

TOSHIBA T/V TUNER. IF ENV 57836 G2F
£3

HITACHI STAND BY MAIN TRANS £10 2213881 AND L210049

PHILIPS K35 ETC 12 WAY SWITCH
WITH KNOBS 50p

60.40 SOLDER 500G £4

HIGH GAIN T/V ANTENNA UHF-VHF BUILT IN 32DB AMP 12V DC/220 AC
£9.25

AMSTRAD VIDEO FRONTS WITH FLAP
LONG CHASSIS ALL MODELS
MADE IN 1991 TO 1992 AND DECCA PRO LINE
£3

AMSTRAD VI VIDEO CASSETTE MECHANISM FITS 30 DIFFERENT MODELS – OSAKI – TATUNG – DECCA – AKAI ETC 1991 TO 1992 WITH SINGLE PLAY HEAD
£20

AMSTRAD 6000 HEAD WITH MOTOR LP
£12

AMSTRAD – LONG CHASSIS AND SHORT CHASSIS
POWER SUPPLY £4
MODELS 1991 TO 1992

AMSTRAD – DOUBLE DECKER SWITCH MODE
£8 POWER SUPPLY

AMSTRAD – DOUBLE DECKER PANELS.
DOUBLE DECKER FRONT £7

AMSTRAD LONG CHASSIS DISPLAY PANEL
1992 TO 1993 £4

AMSTRAD TUNER UE33-B01 £3 IF £2

6 FOR £10 TX10 FOCUS UNIT

CONVERSION KIT ITT TELETEX £8
BURGLAR ALARM SIREN 12 VOLT 50p

HANDSETS AMSTRAD EASY CONTROL
MODELS 4600 TO 8600 £3 each

FERGUSON THOMSON SAT HANDSET SRD1 TO SRD4 £2 each

AMSTRAD NEW VIDEO DISPLAY PANELS ETC. YEAR OF MODELS 1991 TO 1992 – 20 FOR £10

1993 TOSHIBA FAST TEXT HAND SET £3.50

AMSTRAD IC FOR VIDEOS 6206 TO 8600
DISPLAY IC 14 DN 728 AND 14 DN 513

AMSTRAD 6000 MODULES IC MN616 3AS AND 6367S

TOSHIBA HEAT SYNC COMPOUND £6 FOR KILO DRUM

SENDZ COMPONENTS

63 BISHOPSTEIGNTON, SHOEBURYNESS, ESSEX SS3 8AF
NORMALLY SAME DAY SERVICE • SUBJECT TO AVAILABILITY
No accounts. • Technical information by telephone only • No credit cards
Unless specified add £1.70 P P to small orders • Additional charges for heavier items • Specific P.P.charges are PER ITEM • For UK addresses please add P P TO ORDER THEN 17½% VAT TO TOTAL • This applies for the EC unless VAT No. is given • EXPORTS - P.P. at cost •
Postal Order Cheque with order
Callers to shop - 212 London Road, Southend • Open 9.30-1, 2.15-5
Tel 0702 332992 • Fax 0702 338805 •
GVMT School orders on official headings

DIODES

Bridge KBF-08	40p
BY 126	10p
BY 127	10p
BY 133	10p
BY 134	10p
BY 176	25p
BY 179	40p
BY 184	25p
BY 187	10p
BY 190	40p
BY 196	30p
BY 198	10p
BY 204/4	8p
BY 206 – BY 407 Eqv.	8p
BY 208/800	8p
BY 210/400	5p
BY 210/800	10p
BY 223	60p
BY 226	15p
BY 227	15p
BY 228 1500v	20p
Flat BY229 black	15p
BY 229 Red	20p
BY 229/400	30p
BY 229/800	30p
BY 237	5p
BY 254	10p
BY 255	30p
BY 298	10p
BY 299	10p
BY 406	8p
BY 527	20p
BY 407a	10p
BY 448	10p
BY 500/200 – 5 amp	8p
BY 527	10p
BY 602	10p
BYV 26C	10p
F247	10p
GP20G	5p
GRP80G (TX10)	30p
XK 3102	50p
BYV 28/200	20p
Bridge TX10 800/3 amps	30p
KBPC35-02 Bridge	£1.50
Bridge Rec. D35B10	40p
BYT71/800	12p

Hitachi sets etc.

STR454	£2.00
STR6020	£6.00
S 2000AF line o.p.	£1.00
2SC940	£1.00
BU 105/04	80p
BU 108	£1.00
BU 124	50p
BU 126	80p
BU 180a	65p
BU 204	60p
BU 205	75p
BU 206	£1.00
BU 207	£1.00
BU 208	80p
BU 208A	£1.50
BU 208D	90p
BU 222	£1.00
BU 326	£1.00
BU 407	60p
BU 508A	90p
BU 508AF	£1.00
BU 508D	80p
BU 705	£1.00
BU 806A	£1.00
BU 807	£1.00
BU 808DFI	£1.00
BUK 454/600	£1.00
BU 824	50p
BUT 11	50p
BUT 11AF	£1
BUT 13 600V-28A	£1.00
BUT 18	£1
BUW 84	60p
BYW 20-08-9	£1.00
BYW 95	10p
BUX 39 25A-150V	£1.00
BUX 84	50p
BUY 49	20p
BUK 444/800	£2.00
BUK 445/600	£2.00
BUK 454/600	£2.00
TIC 106a	30p
TIC 116m	30p
TIC 116n/Y 1003	30p
TIC 126N	30p
TIC 226m	30p
TIC 236m	30p
TAG 226/600	30p
TIP 29	25p
TIP 30	25p
TIP 30A	25p
TIP 30B	25p
TIP 30C	25p
TIP 31	25p
TIP 32	25p
TIP 33B	50p
TIP 33C	70p
TIP 34A	50p
TIP 34B	60p
TIP 34C	70p
TIP 35B	50p
TIP 35C	70p
TIP 35D	80p
TIP 36	50p
TIP 36C	70p
TIP 41	15p
TIP 41B	40p
TIP 41D	70p
TIP 42	10p
TIP 42/BRC 6109	10p
TIP 48	40p
TIP 49	30p
TIP 57	30p
TIP 100	30p
TIP 102	30p
TIP 110	20p
TIP 115	50p
TIP 117	50p
TIP 125	35p
TIP 126	40p
TIP 127	40p
TIP 130	30p
TIP 131	6p
TIP 136	30p
TIP 140	50p
TIP 142	80p
TIP 640	50p
TIP 2955	35p
TIP L761A-1000V/4Amp	75p
T6032	30p
T6036	40p
T6040	40p
T6047	40p
T6049	40p
T6051	40p

Voltage Regulators

+5V/UA78P05SC	30p
−8V/79M08c	30p
+6V/78M06c	30p
LM 317T	30p
LM 337	30p
LM 342/18	30p
LM 340T 5.0	50p
+12V/LM 340T12	50p
+18V/MC78M18	20p
+24V/78M24	30p
MC 7724cp	40p
MC 7824	40p

Ferguson ICs

Ferg-TX982	£3.00
TMP47C 634N 2685	£3.00
ST6391 B1/B2 ICC7	£4.00

ICC5 Main ICs

ICC Remote I.C.	
CCUFRG07	£7.00
CCUFRG09	£8.00
IC FERG TX982	£3.00
IK7 ST6391 B1	£3.00
ST 6393 B1/1M	£3.00
BYX 10	10p
BYX 38/300	25p
BYX 55/350	10p
BYX 55/600 (Bead)	10p
BYT 71/600	15p
BYV 95B	10p
BYV 95C	12p
BYV 96D	10p
BYZ 106	10p
BW 41	15p
BYW 56 2A/1000v G11	8p
BYW 29/50	15p
BYW 95C	10p
2SC3795	30p
2SC3973B	30p
2SC7350	15p
2SD180 TO3 80v/6A	15p
2SD200	£2.00
2SD401	£1.00
2SD716	£1.00
2SD787	30p
2SD789	30p
2SD820	£1.00
2SD868	75p
2SD880	30p
2SD1264	£1.00
2SD1266	£1.00
2SD1415	£1.00
2SD1427	£1.00
2SD1432	£1.00
2SD1576	£1.00
2SD1577	£2.00
2SD1878	£1.00
2SK30A	10p
BFX29	30p
BFX84	25p
BFY50	15p
BFY52	20p
BFY90	25p
BLY49	25p
BPW41	25p
BRC116	25p
BRX43	15p
BRX48X	10p
BRY56	30p
BSS68	10p
BSY79	10p
BSY95a	10p
BTY80	20p
BSX19	17p
BSX20	17p
FT3055	30p
TCE82	30p
TCE520	30p
2N930	5p
2N2221	8p
2N2222	8p
2N2906	10p
2N3055	40p
2N3566	10p
2N3702	10p
2N3711	20p
2N3583	50p
2N3904	15p
2N4355	10p
2N4442	£1.00
2N4444	£1.00
2N5278	20p
2N5296	40p
2N5983	30p
2N6099	40p
2N6109	40p
2N6130	50p
2N6133	20p
2N6348	20p
2N6399	10p
2SA437	20p
2SA673P	10p
2SA844P	10p
2SC643A	£1.00
2SA992	10p
2SB474	30p
2SB566	10p
2SB686	75p
2SC515A	£1.00
2SC772	20p
2SC381	10p
2SC458	50p
2SC491	50p
2SC732	10p
2SC733	10p
2SC940	£1.00
2SC1030	£1.00
2SC1061	30p
2SC1162 C/18	30p
2SC1514	30p
2SC1520	25p
2SC1546	20p
2SC1617	£1.00
2SC1725	20p
2SC1740	20p
2SC1756	50p
2SC1942	£1.00
2SC2068	20p
2SC2073	8p
2SC2229	15p
2SC2688	20p
TAA7750	50p
HA411485	£1.00
UPC1373	50p
M586577	£1.00
M491BBI	£3.00
M50441/550	£1.00
M58658P	£1.00

2436792	£10.00
2436797	£10.00
AT2078/25	£10.00
TFB4032BD	£10.00
TFB4110BD	£10.00
R 1038	40p
R 1039	40p
R 2009	80p
R 20106	£1.00
R 2029	50p
R 2210	60p
R 2257	60p
R 2265	50p
R 2305	50p
R 2306	30p
R 2322/2323	pair 80p
R 2323	15p
R 2396	50p
R 2461	80p
R 2030	50p
R 2433=BD124	30p
R 2540	£2.00
R 2737	40p
R 2738=TIP41	30p
R 2775=TIP41c	40p
R 3129=TIP47	40p
T 6068V	50p
R 4050	£1.00
S 2008b	80p
2SD898B	£1.00
2SC1942	£1.00

S.W. Filters

HW2011	50p
HW2013	50p
SW453	50p
SW150	£1.00
HW2013	50p
RW303	50p
SY2153	50p
SW185	£1.00
SW153A	50p
SW154	50p
SW173	50p
F1035B	50p
F1045A	50p
Philips Handset IC	£3.00
SAA3010F	£3.00
MAB8461/WO63	£3.00
MAB8420P-C031	£3.00
MAB84200B-6	£3.00
MAB8440P-D070	£3.00
MAB8440P-DO33	£3.00
MAB8440P-D056	£3.00
MAB8441P-T001	£3.00
MAB8441P-T132	£2.00
BCX31	25p
BCX32	25p
BD116	25p
BD124	30p
BD124 (metal)	30p
BD130Y	25p
BD131	30p
BD132/238	30p
BD135	25p
BD136	30p
BD138	30p
BD140	30p
BD176	25p
BD182	£1.00
BD183	70p
BD202	30p
BD204	30p
BD207	60p
BD221	20p
BD222	20p
BD228	30p
BD226	20p
BD233	30p
BD234	25p
BD235	30p
BD238	30p
BD239	15p
BD240	50p
BD243c	30p
BD244	50p
BD250a	30p
BD252	20p
BD253B	50p
BD331	20p
BD373b	20p
BD416	25p
BD433	25p
BD437	30p
BD438	60p
BD139	30p
BD439	50p
BD544D	40p
BD650	50p
BD678	30p
BD681	30p
BD682	30p
BD507	50p
BD508	30p
BD509	30p
BD510	30p
BD517	30p
BD519	30p
BD534	30p
BD535	30p
BD544D	30p
BD562	30p
BD610	40p
BD676A	30p
BD807	20p
BD826	50p

BD646	50p
BD933	30p
BD939	30p
BD948	30p
BD731A	30p
BDX75	20p
BDV64B	50p
BDU65	50p
BF761	30p
BF769	30p
BF788	20p
BF819A	30p
BF858	30p
BF869	30p
BF871	30p
BFR32	7p
BFR81	15p
BFS60	10p
BFT42	20p
BFT57	20p
BFW11	30p
BFX85 100V, 1 amp	30p
BSD215	50p
MR1366	20p
AN635C	£2.00
BRC-M-200	40p
BRC-M-300	50p
BRC 1693	£1.00
BRC 3064	£1.00
BTT822	£1.00
BTT6016	£1.20
BTT6018/ML237B	£1.50
BTT6218	£1.50
BTT8124	£1.00
BTT8224	£1.00
BUP22A	£1.00
CA270AE	50p
CA270CW	50p
CA270CE	50p
CA920AE	£1.00
CA1310	50p
CA3046	50p
CA3065Q	50p
CA3094AE	50p
CA3123	40p
CA3146	£1.00
CA3189	40p
CBF16848	50p
CD4510	30p
CD4555BE	50p
DM7492	50p
HA1124A	40p
HA1196	40p
HA1377	£2.00
HA1377	£3.00
HA11223	40p
HA11423	£1.00
HA11440	50p
HA11484	£3.00
HA11485 Ant	£1.00
HA17458	50p
HEF4001	10p
HEF4518B	25p
HBF4011AF	10p
HEF4053B	30p
HEF4066BP	20p
HEF4528	20p
HD3890C	£3.00
K5731D 1001012	£1.00
LA3220	50p
LA4102	£1.00
LA4261	£1.00
LA7830	£2.00
LA7831	£2.00
LM1111N	£1.00
LM1017N	25p
LM8361	£3.00
PCF8571P	£5.00
M913	£2.00
M1024=SAA	£2.00
M1025=SAA	£2.00
M5840A-84RS	£3.00
MC476p	£1.00
MC1307	75p
MC1312	
MC1330 GN76530	£1.00
MC1352	£1.00
MC1358	£1.00
MC1377	£1.50
MC1496	50p
MC14002	15p
MC14013	25p
MC14016	25p
MC14066	30p
MC14514	50p
MC1748	80p
MEM4956	£1.00
ML231	£2.50
ETT6016	£2.00
ML232	£1.00
ML236E	£1.00
ML237B	£1.00
ML238B	£4.00
ML239	£2.00

THYRISTORS

Philips Kits OT121	50p
IR106A	30p
BT151/500	20p
BT106 Plastic	30p
BY106 Metal	£1.20
BT119	£1.00
BT120	£1.00
BRC4443	75p
G11 Tyristor	60p
Decca 80-100	60p
2N4444	£1.00
MCR72-6	25p
OT112	£1.00
TF320M	£1.00
HC8441	£2.00
17052	£2.00
17088H	£2.00
17089R	£2.00
17053R	£2.00
5P2M	50p
RCA Line Thyristor	
CQ240H	£2.00
CC0240R	£2.00

Thermistors

PTHBG180M	75p
G8 Degausing	35p
Philips type VA1104	70p
ITTP726312	15p
PTH451 AOR	15p
PT37P Fits Pye & PT34 Degausing Thermistor (fits most sets)	20p
POS 009 Philips	50p
POS 016 Philips	50p

ML926	£1.00
MAB8400B-C	£2.00
MAB8440 P-D070	£2.00
MAB8441 PT001	£5.00
MAB8420PC035	£2.00
MAB8422P-Q005	£2.00
MAB8440P	£2.00
MAR8400XX	£3.00
M708LB1	£2.00
MM5387	£1.00
MM5611	£1.00
MM5840	£3.00
PCD8571P	£3.00
K35 Philips Receiver IC	
MA1250 BJC	£3.00
M491BB1	£3.00
M5840H-84RS	£5.00
MM5290N-4	75p
MM53108N	£4.00
MN650	£1.00
MN1250BJC	£2.00
MR1366	20p
NE646	50p
HD38980C	£3.00
PH2369	10p
PCD8571P	50p
PCD8572P	£2.00
SAA611	£1.00
SAA661	£1.75
SAA1073	£3.00
SAA1074	£3.00
SAA1075	£3.00
SAA1124	£2.00
SAA1174	£3.00
SAA1176	£2.00
SAA1250	£3.00
SAA1251	£4.00
SAA1272	£3.00
SAA1274	£3.00
SAA1276	£3.00
SAA1293	£6.00
SAA3027P	£1.00
SAA5000A	£1.50
SAA3049	£3.00
SAB3013	£2.00
SAB3205	£3.00
SAB3210	£2.00
SAB4209	£2.00
TBO0124	£1.00
SAA3008P	£3.00
SAA5000A	£2.00
SAA5010	£2.20
SAA5012A	£5.00
SAA5020	£3.50
SAA5025D	£3.00
SAA5030	£4.50
SAA5040A	£3.00
SAA5042A	£3.00
SAA5043	£4.00
SAA5050	£4.50
SAA5051	£2.00
SAA5052	£2.00
SAA5053	£2.00
SAA5240	£5.00
SAA5241 P/A TEX IC	£5.00
SAE1032p	£2.50
SAE1039	£2.00
SAS570T	75p
SAS660	£1.00
SAS670	£1.00
SAS580	75p
SAS590	75p
SAS3210	£2.00
SL437F	£4.00
SL471	50p
SL480	£1.00
SL918	£4.50
SL1430	£1.00
STK4793	£3.00
STK5471	£3.00
STR58041	£5.00
TA7122	£1.15
TAA320A	50p
TAA470	£1.50
TAA570	75p
TAA611B	£1.00
TAA621	£2.00
TA7108P	£1.00
TA7117	50p
TA7120P	50p
TA7315AP	50p
TA7137P	50p
TA7193AP	£3.00
TA7240AP	£3.00
TA7265	£3.00
TA7227P	£1.00
TA7265AP	£3.00
TA7608AP	£3.75
TA7680AP	£3.00
TA7750P	30p
TBA120A	40p
TBA120AS	40p
TBA120SA	40p
TBA120B	40p
TBA120SB	40p
TBA120T	50p
TBA120SQ	£1.00
TBA120U	75p
TBA120Q	30p
TBA120C	40p
TBA1440	£1.00
TBA1441	£2.00
TBA231	75p
TBA395Q	50p
TBA396Q	£1.00
TBA396	75p
TBA440P	£1.00

TV CRYSTALS

4MHz	
4.433-619	
6MHz	
8.867238	
11.059.000	
Large or small Antistatic Isolators	50p each
Disc Type Black	10p

Filters

CSA 3.97M	15p
6MEGtCDA	25p
6MHztSFE	25p
SFE 5.5MHz	20p
CDA5.5	25p
SFD460B	15p
CSB455A	15p
TA8662	£2.00
CCU3000	£1.00
AN5836	£3.00
BA6219	£2.00

HITACHI

U/V Video Hand Set	£14

TBA1440C	£1.00
TBA480Q	£1.00
TBA520	£2.00
TBA530	£2.00
TBA540	£1.00
TBA560CQ	£1.00
TBA570	£1.50
TBA625	50p
TBA651	£2.00
TBA673	£1.00
TBA750Q	£2.50
TBA780	£1.50
TBA800	50p
TBA810AP	60p
TBA810S	60p
TBA820	60p
TBA820M	25p
TBA920	£1.50
TBA920Q	£1.50
TBA990Q	£1.00
TMS1000NL	£2.00
TMS1943 N2L (clockchip)	£1.00
TMS9980	£4.00
TMS9901	£1.00
TMS2708JG45	45p
TMS2716JL	£1.00
TMS3529	£1.00
TMS3720ANS	£3.00
TMS4014	70p
TX-012	£1.00
TMS9902	£1.20
ULN2004P	£1.50
ULN2216	75p
UPC566H	£1.00
UPC585C	£1.00
UPC1009C	£2.00
UPC1031H	£2.00
UPC1353C	£1.00
UPC1363C	£2.75
UPC1364C	£2.00
UPX1365C	£2.00
UPC1366C	£1.00
UPC1378H	£2.00
UPC1514C	£3.00
UPC2002	35p
UPD1943G	£2.00
UPD8049HC	£2.00
SN29848	50p
SN29770BN	£2.00
SN29771BN	£2.00
SN29772BN	£2.00
SN76001	£1.00
SN76013ND	£2.00
SN76018	£1.00
SN76110N	£1.00
SN76115AN	50p
SN76131	50p
SN76141N	£1.00
SN76226	£1.00
SN76227N	£1.00
SN76228N	£1.00
SN76270	£1.00
SN76532N	£1.00
SN76545N	£3.00
SN76546	£3.00
SN76550	30p
SN76552	30p
SN76570	£1.00
SN76620	50p
SN76660N	40p
SN76620AN	50p
SN76666	£1.00
SN76705N	£1.00
SN76707N	75p
SN76708AN	75p
SN76720	£1.00
SN76709N	£2.00
UA783P3C	40p
BT100A'02	40p
BT138/10A	70p
BT146	30p
TBA540Q	£1.50
TCA270	£1.00
TCA270Q	£1.00
TCA270S	£1.00
TCA270SQ	£1.00
TCA800	£1.50
TCE120CQ	£1.00
TCE520	30p
TD6306P	£3.00
TDEA440Q	50p
TDA1003A	£1.00
TDA1010	£1.00
TDA1013	£1.00
TDA1012	£1.00
TDA1013A	£1.00
TDA1060A	£1.50
TDA1035SB	£1.00
TDA1072	£1.00
TDA1150	50p
TDA1151	30p
TDA1154	50p
TDA1170S	£1.00
TDA1180	£2.00
TDA1190	£1.00
TDA1200	75p
TDA1270	£1.50
TDA1327A	69p
TDA1365	£3.00
TDA1512	£2.00
TDA1540P	£3.00
TDA1670A	£2.00
TDA1908A	£1.00
TDA2002	£1.00
TDA2003	25p
TDA2004	£2.00
TDA2006	£1
TDA2008	£2.00
TDA2010	£1.00
TDA2020	£1.00
TDA2030	£2.00
TDA2140	£3.50
TDA2160	£1.00
TDA2320	50p
TDA2545A	£1.00
TDA2600	£3.00
TDA2640	£2.00
TDA2522	£5.00
TDA2530	£1.50
TDA2532	£1.00
TDA2540	80p
TDA2541	£1.00
TDA2542	£1.00
TDA2545	£2.00
TDA2546	£2.00
TDA2556	£1.00
TDA2560	75p

TDA3565	£3.00
TDA2575A	£1.00
TDA2577A	£2.00
TDA2578A	£2.00
TDA2579A	£2.00
TDA2581	£2.00
TDA2591	£1.00
TDA2593	£3.00
TDA2560	50p
TDA2556	£1.50
TDA2600	£3.00
TDA2611A	£1.00
TDA2611AQ	£1.00
TDA3651A	£1.00
TDA2653	£4.00
TDA2640	£2.00
TDA2593	£1.00
TDA3047	£3.00
TDA3048	£3.00
TDA3083	£2.00
TDA3190	£1.00
TDA3300B	£5.00
TDA3301	£3.00
TDA3505	£3.00
TDA3506	£3.00
TDA3561	£3.00
TDA3560	£4.00
TDA3561A	£3.00
TDA3566	£3.50
TDA3564	£4.00
TDA3565	£3.00
TDA3571A	£2.75
TDA3581	£3.00
TDA3590	£3.00
TDA3591	£1.00
TDA3592A	£3.00
TDA3650	£7.00
TDA3651	£3.00
TDA3651AQ	£3.50
TDA3652	£3.50
TDA3653AQ	£2.00
TDA3654	£2.00
TDA3654Q	£2.00
TDA3710	£3.50
TDA3800	£4.00
TDA3180	£2.00
TDA4260	50p
TDA4501	£3.00
TDA4505NE	£3.00
TDA4420	£2.00
TDA4439	£2.00
TDA4600	£3.00
TDA4601	£2.00
TDA8190	£3.00
TDA8703	£3.00
TDA8349	£3.00
TDA9403	£1.50
TDA9503	£3.00
TDB2033	£1.00
TDD1610S	50p
TD6306P	£2.00
TDA1060	£3.00
TEA1009	50p
TEA1039	£2.00
TEA1060	£2.00
TEA2017	£2.00
TEA2029C	£3
TEA5114	£1.00
TDA3300B	£6.00
SIL4516	50p
SN16861NG	50p
SN16862AN	£1.00
SN16964AN	50p
SN29764AN	£1.00
UA721	40p
UA7300	40p
MPS43A	25p
MJ13005	30p
MJE51T	25p
MJE340	28p
MJE660	25p
MJE661	25p
MJE3055	£1.00
MJE2801	30p
MJE2955	50p
MJE13005	50p

Transistors

A1222	25p	BF181	20p
A1223	25p	BF182	20p
A1233	25p	BF184	20p
AC106	25p	BF194	10p
AC121	25p	BF195	10p
AC124	25p	BF196	10p
AC128	25p	BF197	12p
AC137	25p	BF198	10p
AC151	25p	BF199	10p
AC131	25p	BF200	20p
AC138	25p	BF222	10p
AC152	25p	BF224	15p
AC153K	25p	BF238	20p
AC142K	25p	BF240	16p
AC169	25p	BF244	40p
AC176	25p	BF245b	20p
AC178K	25p	BF255	20p
AC179	25p	BF256	20p
AC186	25p	BF257	20p
AC188	25p	BF258	25p
ACY21	25p	BF262	15p
AD143	50p	BF263p	25p
AD149	50p	BF264	15p
AF17A	25p	BF271	10p
AF139	25p	BF273	10p
AF181	£1.00	BF274	10p
AF239	25p	BF324	25p
AF367	25p	BF337	50p
AL102	£1.75	BF355	30p
BLY49	50p	BF362	20p
BF115	20p	BF363	15p
BF121	20p	BF367	15p
BF127	20p	BF391	15p
BF137	20p	BF394	10p
BF157	20p	BF419	30p
BF160	20p	BF422	15p
BF161	20p	BF423	15p
BF164	60p	BF448	30p
BF179	30p	BF470	30p
BF180	20p	BF471	30p
		BF597T	10p
		BF694	10p

Thorn Transformers

DT2076/78	£10.00
90D3-035-003	£10.00
90D4-106-003	£1.00
90D3-038-001	£5.00
OT204130	£3.00

I.C.s

MA721PC	£1.00
MS0430-8505P	£1.00
TD6359P	£1.00
M58657P	£1.00
PCD8572	£1.00
HD74HC86P	£1.00
UPD114LC-2	£1.00
MN1250BJC	£1.00
M50441-5505P	£1.00
M491BB1	£4.00
HA513385	£1.00
14DN 728A	£4.00